Hayward Climate Action Plan

October 8, 2009

Town Green

HDR

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Call to Action

"Delay is no longer an option. Denial is no longer an acceptable response. The stakes are too high; the consequences too serious."

-Barack Obama on Climate Change
November, 2008

There is no longer any doubt in the international scientific community that human induced climate change is real. Heat trapping emissions released by fossil fuel use, deforestation, industrial processes, and other human activities are causing a warming of global average surface temperatures. This temperature rise is associated with a host of impacts that will significantly alter human life including: [1]

- Increased water stress and frequency of drought in mid-latitudes
- Increased species extinction and range shifts
- Decreased agricultural productivity
- Increased damage from floods and storms
- Increased rates of respiratory and infectious disease, and mortality from heat waves, floods, and droughts

The good news is that technical solutions to the climate crisis exist. We have low-carbon energy sources. Better land management and agricultural practices exist. There are alternative processes and materials that can reduce the impact of industry. Moreover, human ingenuity is constantly producing new approaches to providing the goods and services we need to prosper at a lower environmental cost. However, to reduce emissions at a scale necessary to avoid the most catastrophic impacts above, it will take a concerted effort at all levels to overcome cost and political barriers to the effective implementation of both existing and to-be-developed solutions.

Federal policy must be developed to create a U.S. reduction strategy that is compatible with global initiatives and one that demonstrates leadership. Regional policies and commitments are critical to the success of reduction strategies at the lowest cost, and the implementation of reform in such areas as transportation and energy, which are frequently provided at a regional scale. Local governments have a great deal of responsibility for the implementation of climate change mitigation strategies because many planning, infrastructure, and investment decisions happen at the local level. Local governments also have a unique ability to engage citizens and support individual efforts. Private businesses must recognize the triple bottom line and take voluntary actions to support mandatory ones. Finally, individual citizens – by civic engagement and personal behavior – have some of the greatest responsibility and power to affect change. Each one of us is capable of protecting the health and happiness of future generations.

With this sense of urgency and collaboration in mind, the City of Hayward has developed this Climate Action Plan. We sincerely appreciate the efforts of each individual that tackles climate change, at every level, and are grateful to all who aid in the successful implementation of this Plan.

[1] International Panel on Climate Change, 2007. "Climate Change 2007: Synthesis Report – Summary for Policymakers." http://www.ipcc.ch/pdf/assessment-report/ar4/syr/ar4_syr_spm.pdf

10 Steps to Reduce your Carbon Footprint and Save Money

From CoolClimate.org

1. Change your commute!
Did you know that one third of the CO_2 produced in the US is from the transportation of people or goods? Pick one day a week to walk, bike, take public transportation or carpool to work or when you're running errands. If possible, live close to your workplace. When driving, remember to combine several car trips into one trip and avoid idling. Additionally, you can get better fuel efficiency by following the speed limit. Exceeding the speed limit by just 5 mph during highway travel results in an average fuel economy loss of 6%.

2. Be a better consumer!
Did you know that the average American generates about 4.4 lbs of trash each day? To reduce the amount of trash you generate, follow these few easy steps. Use re-usable coffee mugs and shopping bags. If you forget your mug or bag at the store, buy a new reusable mug or bag and keep the extra one in your purse or car for use the next time you're out. Alternatively, set aside $1 each time you forget your mug or bag; depending on your memory, you'll have enough funds to purchase a reusable item sooner or later. Also, reuse as many things as possible and recycle at home, work, and school.

3. Shop local!
The shorter the distance your food travels to your plate or that product travels to your home, the fewer greenhouse gases are produced. Declare one day a week "Local Day" and eat foods produced within 50 miles of your house.

4. Dry-up Household Water Consumption!
Did you know that water-related energy use consumes 19% of California's electricity, 30% of its natural gas, and 88 billion gallons of diesel fuel every year? To reduce your water consumption at home, turn off your water when it's not being used, take shorter showers, stop unseen leaks by reading your meter, install low-flow shower heads and aerators on your faucet, install and use water efficient landscaping and irrigation methods (for example, plant drought tolerant plants and/or install permeable surfaces and drip irrigation systems), and use EnergyStar appliances.

5. Unplug it!
Did you know that appliances, chargers, home theater equipment, stereos and televisions use electricity even when their power is "off"? Eliminating this "leaking" electricity could save you 6–26% on your average monthly electricity bill. Take a walking tour of your home and unplug seldom-used appliances and install power strips so that the power to frequently used items can be easily turned off.

6. Change the lights!
Replace any incandescent light bulbs that remain in your home with compact fluorescent lights (CFLs). Replacing one incandescent light bulb with a CFL can save $30 or more in electricity costs over the bulb's lifespan.

7. Set your Thermostat for the Season!
Set your thermostat in winter to 68°or less during the daytime, and 55° before going to sleep (or when you're away for the day), to save 5-20% of your space heating costs. During the summer, set thermostats to 78° degrees or more to save 5-20% of your cooling costs. For an easy fix, purchase an inexpensive programmable thermostat that makes these changes for you.

8. Increase Energy Efficiency at home!
Did you know that you can save up to 350 lbs of CO_2 and $150 per year at home by simply keeping air filters clean? To determine more ways to increase energy efficiency, take advantage of free home energy

audits offered by many utility companies. When you are ready to purchase an appliance, ensure that you purchase an EnergyStar appliance. To reduce carbon emissions associated with energy use, install or purchase alternative energy for your electricity needs.

9. Stop Unwanted Services!
Did you know that junk mail production in the US consumes as much energy as 2.8 million cars? Stop your junk mail at www.directmail.com/junk_mail. Stop unwanted catalogs at www.catalogchoice.org.

10. Get your friends and families to reduce their carbon emissions!

Acknowledgments

Funding

The preparation of this Climate Action Plan was funded in part by a grant from the Bay Area Air Quality Management District. The City of Hayward is grateful to the District for their support.

The Hayward Community

For their participation in community meetings and thoughtful suggestions.

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Executive Summary

Introduction

The City of Hayward and its citizens recognize that climate change poses a potential threat to the community and to the larger environment. The City and its citizens also recognize that activities taking place within the City result in the release of the heat-trapping global warming gasses that contribute to climate change. Hayward, therefore, wishes to take a stance against climate change by reducing the amount of greenhouse gas (GHG) emissions from activities taking place within the City.

Hayward made this intention clear in 2005, when the Mayor of Hayward signed the U.S. Conference of Mayors Climate Protection Agreement, which states, "We will strive to meet or exceed Kyoto Protocol targets for reducing global warming pollution by taking actions in our own operations and communities." [2] In June 2006, the City joined ten other local governments in Alameda County participating in the Alameda County Climate Protection Project (ACCPP). By joining ACCPP, Hayward embarked on an ongoing coordinated effort to reduce the emission of gasses that cause global warming. ACCPP was launched by the Alameda County Waste Management Authority & Recycling Board (StopWaste.Org) in partnership with the Alameda County Conference of Mayors and ICLEI - Local Governments for Sustainability (ICLEI).

The Climate Action Plan (CAP) provides a roadmap for achieving a measurable reduction in GHG emissions; so adopting the CAP will be a discernible step towards emissions reductions. The CAP recommends GHG emissions targets that will align Hayward's reduction targets with those of the State of California and presents a number of strategies that will make it possible for the City to meet the recommended targets. The CAP also suggests best practices for implementing the Plan and makes recommendations for measuring progress.

The CAP will be implemented over an extended period of time. Hayward recognizes that it may not be possible to implement some of the ideas presented in the Plan with the current economic conditions. Nevertheless, it is important to keep ideas on the table that could make a cost-effective contribution to reducing emissions at some future time in the life of the Plan.

Hayward's Approach to Climate Protection

Hayward has adopted ICLEI's Cities for Climate Protection methodology for managing GHG emissions. This performance-based methodology provides five milestones to assist local governments in developing and implementing local approaches for reducing global warming. The milestone process consists of the following five milestones:

Conduct a baseline emissions inventory and emissions forecast
Adopt an emissions reduction target
Develop a Climate Action Plan for reducing emissions
Implement policies and actions that will reduce emissions
Monitor and verify results

ICLEI assisted Hayward in completing a baseline emissions inventory (Milestone 1) in 2006, and subsequently updated the inventory in June 2008. The inventory is summarized in Section 2 and details are presented in Appendix A. Milestone 2 (adopting targets) and Milestone 3 (develop Climate Action Plan) will be completed when this Climate Action Plan is adopted by the Hayward City Council. This

[2] US Conference of Mayors Agreement http://www.usmayrs.org/climateprotection/documents/mcpAgreement.pdf

Plan also includes recommendations on how to achieve the fourth and fifth milestones: implementation, monitoring, and verification.

In addition to signing on to ACCPP and developing this CAP, the City of Hayward has already adopted a number of programs that will help reduce emissions. A summary of these programs including the Private Development Green Building Ordinance, the Environmentally Friendly Landscaping Guidelines, and policies supporting transit-oriented development, is provided in Section 1 of the CAP.

Overview of the Climate Action Plan

Purpose of the Plan

The purpose of the CAP is to provide direction for the community's efforts to reduce greenhouse gas (GHG) emissions in the coming decades. The Plan recommends specific actions that the City can take to meet its emissions reductions targets. With the Plan as a framework, the City can make informed decisions about which actions should be implemented immediately, and which actions are better suited for implementation at some time in the future.

Because the Plan is intended to be implemented over an extended period, it is important to realize that the costs and benefits of implementing specific actions will change over time due to changes in economic conditions, new and/or improved technology, changes in public opinion, or for other reasons. Many of the recommended actions will require public investments that may be difficult to justify in the current economic climate, but may be easier to justify at some future time. This means that although a proposed emissions reduction action may seem impossible to implement today, it should not be eliminated from the list forever. Instead, those actions can be retained as potentially valuable reduction actions that may prove feasible and be implemented at some time in the future.

How the Draft Plan was Developed

City staff and its consultants worked with members of the community, elected officials, and representatives from various departments within the City government to develop the CAP. In July 2008, the City hosted a public workshop to solicit ideas for the Plan. Based on feedback received from the community during and after the workshop, the City and its consultants developed a list of recommended actions. This list of potential actions was also reviewed with City staff, and the proposed actions were analyzed in more detail. Emissions savings resulting from these actions were estimated, and assessments were made of how easy or difficult it would be to implement each action. A draft was reviewed by City staff in early 2009, and was circulated for public comment in February and March 2009. A community workshop to discuss the Draft CAP and to solicit feedback from the community was held on March 19, 2009.

Plan Outline

This CAP recommends nine strategies to guide the City's effort in reducing GHG emissions. Each strategy is comprised of several action items. It is anticipated that each of these action items will turn into a multiple-year program that will require its own budget and staff resources to develop and implement. The CAP offers direction in the form of reference material and a recommended implementation strategy, but does not attempt to specifically design programs or policies.

Of the nine strategies presented in the CAP, two strategies focus on reducing emissions from transportation and three strategies address emissions reductions from building energy use. One strategy focuses on reducing waste-related emissions, and one on maximizing carbon sequestration within the City. A future version of the CAP will contain a strategy on climate change adaptation, which will include actions necessary to address rising sea level. At the time of this writing, the Hayward Area

Shoreline Planning Agency had not yet released its sea level rise study. The remaining strategy focuses on community outreach and education.

Summary of Baseline GHG Inventory

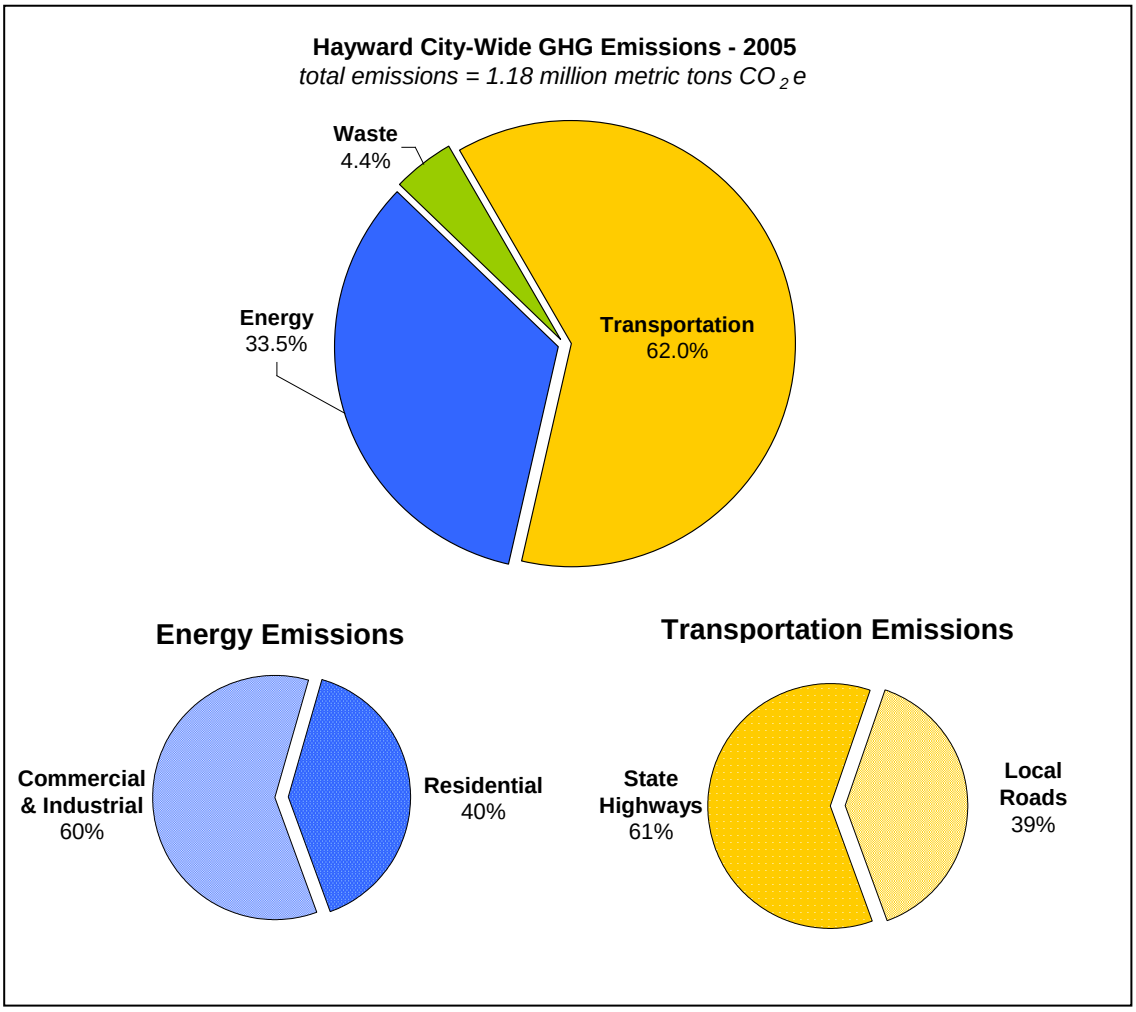


Figure 1: City-wide GHG emissions in 2005
Source: ICLEI

The baseline inventory provides an estimated appraisal of emissions for a given year. The inventory indicates the sources of Hayward's emission, and establishes a solid basis for comparisons between the City's current emissions and future emissions levels. Planners use the baseline inventory to set reasonable reduction targets and to prioritize actions to reduce emissions. To verify that emissions reductions have been achieved, planners can compare future inventories to the baseline inventory.

Findings from the baseline inventory, which was conducted for emissions in 2005, are summarized in the following pages. The community-wide inventory includes emissions from activities taking place within City limits, and the municipal inventory only includes emissions associated with Hayward's government operations.

Community Emissions Inventory Results

Figure 1 illustrates that in the base year 2005, the City of Hayward emitted 1,183,274 metric tons of equivalent carbon dioxide (CO_2e).[3] The transportation sector is the single largest source of emissions, contributing 62 percent of total emissions. Energy in the form of natural gas and electricity accounted for 33.5 percent of Hayward's emissions. The landfilled portion of the City's solid waste accounted for 4.4 percent of Hayward's 2005 emissions.

Municipal Emissions

In the base year of 2005, municipal emissions constituted 0.8 percent of Hayward's total emissions, or 9,647 metric tons of CO_2e (see Figure 2). For comparison, local government emissions typically fall between one and five percent of overall community emissions. As a minor contributor to total City-wide emissions, actions to reduce municipal energy use will have a limited impact on Hayward's overall community emissions levels. However, municipal action can help reduce City government's operating costs and has important symbolic value demonstrating leadership that extends far beyond the magnitude of emissions actually reduced.

[3] Carbon dioxide is not the only gas that contributes to the greenhouse effect. Each greenhouse causes a discrete amount of heating. For example, one ton of CH_4 causes the same amount of warming as 23 tons of CO_2 (1 ton of CH_4 = 23 tons CO_2e). To simplify reporting, it is standard practice to report the carbon equivalent emissions (CO_2e) as opposed to the actual emissions of each gas

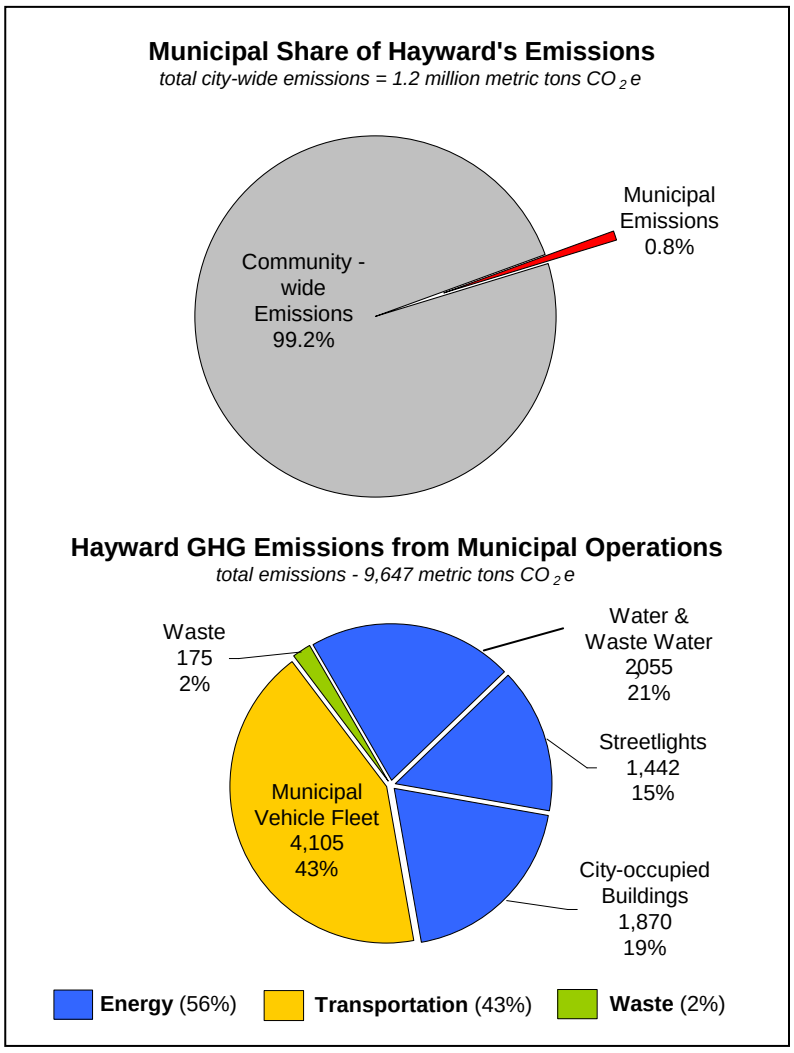

Municipal Share of Hayward's Emissions
total city-wide emissions = 1.2 million metric tons CO2e
Community - wide Emissions 99.2%
Municipal Emissions 0.8%
Hayward GHG Emissions from Municipal Operations
total emissions - 9,647 metric tons CO2e
Waste 175 2%
Water & Waste Water 2055 21%
Streetlights 1,442 15%
Municipal Vehicle Fleet 4,105 43%
City-occupied Buildings 1,870 19%
Energy (56%)
Transportation (43%)
Waste (2%)

Figure 2: Municipal GHG emissions in 2005
Source: ICLEI

Projected Emissions

The emission forecast includes predictions of how GHG emissions may change in the City of Hayward over time if no emissions reductions programs are implemented. The forecast projects the growth in GHG emissions that will occur in future years. The emissions growth is based on estimated population growth and on changes in the employment mix. The City has used the emissions forecast to estimate the required emissions reductions to meet emissions targets.

Two emissions forecast scenarios are presented. The Scenario 1 forecast uses ICLEI's methodology which assumes that the number of drivers, electricity and natural gas use, and solid waste generation will increase over time in proportion to population, number and type of jobs, and housing availability. ICLEI's methodology assumes that fuel economy and the percent of electricity generated from renewable sources remains constant throughout the forecast period. At the time ICLEI developed their estimate, it was reasonable to assume that both vehicle fuel economy and the percentage of renewable

generation in PG&E's electric generation mix would remain constant, but recent legislative activity has created a scenario where emissions will likely be reduced as so cited with these two factors.

The Scenario 2 forecast takes recent legislation into consideration and assumes that both vehicle fuel economy and utility renewable electricity generation will increase over time. Scenario 2 maintains the Scenario 1 assumptions about an increased number of drivers, electricity, and natural gas use, as well as an increase in waste generation.

Figures 3 and 4 show Hayward's emissions projections based on Scenario 1 and Scenario 2 assumptions. There is a significant difference between these two emissions forecasts. Scenario 1 predicts that emissions will increase by 0.28 million metric tons CO_2e between 2005 and 2020, whereas Scenario 2 predicts emissions will only increase by roughly 30,000 tons in that time. The difference in Scenario 1 and Scenario 2 emissions forecasts illustrates that state and federal legislation is expected to have a measurable impact on local emissions. It also exemplifies the importance of advocating for even more aggressive state and federal policies.

Because Scenario 2 is more plausible given the recent changes to state and federal policy, the Scenario 2 forecast is used as a basis for all analyses in the CAP.

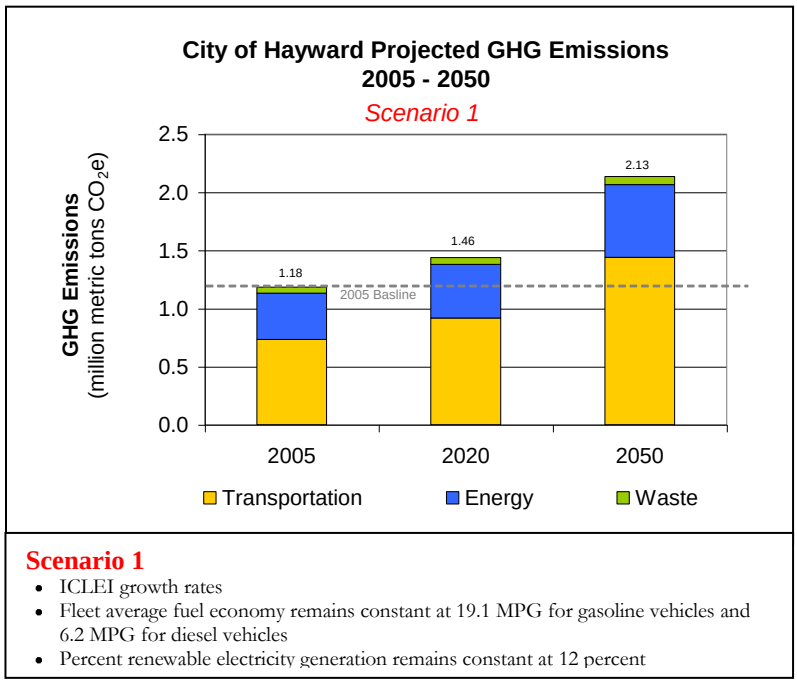


Figure 3: Scenario 1 projected City-wide GHG emissions 2005, 2020, and 2050
Source: ICLEI, City Analysis

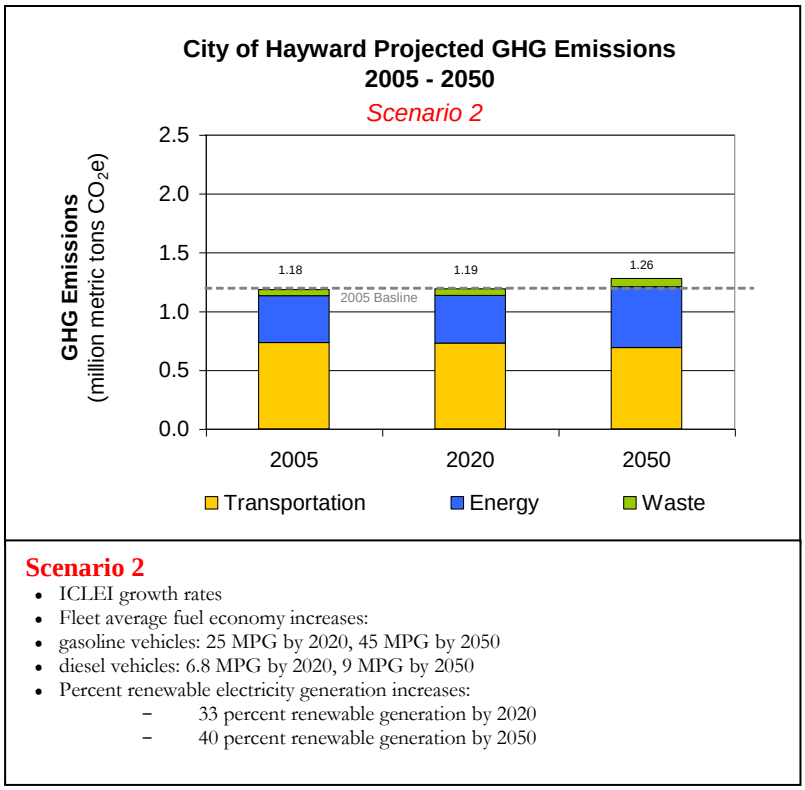


Figure 4: Scenario 2 projected City-wide GHG emissions 2005, 2020, and 2050
Source: ICLEI, City Analysis

Hayward's Emissions Reduction Targets

Hayward's emissions reduction target represents a percentage by which the community aims to decrease emissions below the 2005 baseline, by the target years of 2020 and 2050. The City aims to reduce emissions by the following amounts:

- 6 percent below 2005 levels by 2013 (interim target)
- 12.5 percent below 2005 levels by 2020
- 82.5 percent below 2005 levels by 2050

The difference between Hayward's 2020 projected emissions and its 2020 emissions goal is about 154,642 metric tons CO_2e. This means that if Hayward meets the 2020 target, the City will have prevented 154,642 metric tons CO_2e from being emitted into the atmosphere. This is equivalent to:

- The CO_2 emissions from 28,323 cars driving for one year.
- The CO_2 emissions from electricity use of 20,482 homes for a year.
- The CO_2 emissions from burning 808 railcars worth of coal.
- The carbon sequestered annually from 35,146 acres of pine or fir forest.[4]

[4] Equivalencies calculated with EPA's Greenhouse Gas Equivalencies Calculator (www.epa.gov/cleanenergy/energy-resources/calculator.html).

The interim GHG reductions target in 2013 was established to enable Hayward to set a short-term goal for the first five years of the program. This short-term goal will enable Hayward to benchmark its progress towards meeting the more aggressive longer-term goals.

Hayward based its GHG reductions goals on the goals established in the state's Global Warming Solutions Act (AB 32).[5] Hayward adopted state emissions reductions goals for the following reasons:

- AB 32 goals are backed by detailed analyses which consider, among other things, costs and benefits, technical feasibility, and impact on the economy and environment.
- AB 32 sets aggressive reduction goals, which align with Hayward's commitment to combat climate change.
- By adopting the state's emissions reduction goals, Hayward can help make AB 32 a stronger initiative. AB 32 has already gained the support from several cities, and as more cities adopt their goals, it becomes easier for other cities to join the initiative. By showing support for AB 32, Hayward is sending a strong message to other cities that the initiative is worth supporting.

Reducing Emissions

Approach for Reducing Transportation, Energy, and Solid-Waste-Related Emissions

Section 4 of the CAP describes the general approach taken in each major sector contributing to Hayward's footprint – transportation, energy use in buildings, and solid waste management. These are summarized below:

Approach for Reducing Transportation Related Emissions

1. **Reduce Vehicle Miles Traveled**
   When you don't have to drive, don't drive.
2. **Improve Fuel Efficiency of**
   If you have to drive, drive in a vehicle that does not emit a lot of greenhouse gases.

Approach for Reducing Energy-Related Emissions

1. **Conserve Energy**
   When you don't need the energy, don't use it.
2. **Increase Energy Efficiency**
   When you do need energy - use it efficiently.
3. **Use On-site Renewable Energy**
   Use energy generated from low-emissions or no- emissions sources like solar, wind, or geothermal, that are attached to the building (on-site).
4. **Use Off-site Renewable Energy**
   When you can't produce needed energy on- site, produce low- or no-emissions energy elsewhere (off-site).

[5] AB 32 set the state-wide goal of reducing GHG emissions to: (1) 2000 levels by 2010; (2) to 1990 levels by 2020, which is equivalent to 12 percent below 2005 levels by 2020; and (3) to 80 percent below 1990 levels by 2050, which is equivalent to 83 percent below 2005 levels by 2050.

Approach for Reducing Waste-Related Emissions

1. **Reduce Waste**
   Avoid creating waste when possible.
2. **Reuse and Recycle what you can**
   If you have to create waste, use things that can be reused or recycled – and be sure you can actually reuse or recycle.
3. **Decrease amount of organics going to landfill**
   If you have to create organic waste, avoid sending organics to the landfill where organics decompose into methane: a potent global warming gas.

Emissions Reductions Strategies

In Section 5, the CAP presents the nine strategies for reducing emissions in Hayward. Each strategy contains several actions that Hayward can deploy to reduce GHG emissions.

Strategy 1 – Transportation and Land Use: Reduce Vehicle Miles Traveled

The goal of Strategy 1 is to reduce vehicle miles traveled (VMT) by encouraging residents to use alternative modes of transit, by improving the effectiveness of the transportation circulation system, and through land-use and zoning mechanisms. In the context of this report, alternative mode of transit means any mode that is not driving alone. This could include walking, biking, carpooling, or riding public transit.

Strategy 2 – Transportation: Decrease the Carbon-Intensity of Vehicles

The goal of Strategy 2 is to decrease GHG emissions from motor vehicles by reducing the carbon-intensity, or emissions per mile traveled, of vehicles driven on Hayward's roads. The Strategy targets all vehicles traveling in Hayward, including private, commercial, and City-owned vehicles.

Strategy 3 – Energy: Improve Energy Performance of Existing Buildings

The goal of Strategy 3 is to reduce GHG emissions associated with energy consumed in existing buildings through education programs, regulations, and incentives that aim to reduce electricity and natural gas use.

Strategy 4 – Energy: Improve Energy Performance of New Buildings

The goal of Strategy 4 is to minimize GHG emissions associated with energy consumed in new buildings by setting minimum energy and environmental performance standards for all newly constructed buildings.

Strategy 5 – Energy: Use Renewable Energy

The goal of Strategy 5 is to reduce GHG emissions associated with electricity use by increasing the amount of electricity supplied by renewable sources.

Strategy 6 – Solid Waste: Increase Waste Reduction and Recycling

The goal of Strategy 6 is to reduce GHG emissions associated with the disposal of solid waste. This will be achieved by continuing to implement waste reduction and recycling programs.

Strategy 7 – Sequester Carbon

The goal of Strategy 7 is to encourage activities, such as planting trees, which will maximize the amount of carbon sequestration taking place in the City.

Strategy 8 – Climate Change Adaptation

This Strategy will eventually address ways for Hayward to adapt to the rising sea level. The three member agencies of the Hayward Area Shoreline Planning Agency (City of Hayward, Hayward Area Recreation and Park District, and the East Bay Regional Park District) have contracted with a consultant to prepare a Sea Level Rise Study. The study will evaluate the potential impacts of sea level rise on the Hayward shoreline and the feasibility of making improvements to prevent or mitigate potential flooding. At the time of this writing, the study was not yet available. Staff expects to include a summary of the study in a future version of the CAP.

Strategy 9 – Engage and Educate Community

Hayward's residents and businesses will have to play an active role in reducing emissions. Strategy 9 focuses on specific actions Hayward plans on using to engage residents and businesses in the necessary and vital effort to reduce community-wide emissions.

Community-wide Actions – in order of priority

Table 1: Proposed actions for reducing community-wide emissions: listed in order of priority

Action Number	Short Description	Estimated Annual Emissions Reductions (metric tons CO2e) *assumes Scenario 2 fuel economy and renewable electricity generation and that program goals are achieved		Priority
		2020	2050	
Community-wide Actions - potential emissions reductions calculated and City has direct control over implementation				
Action 3.9	offer energy efficiency financing program for commercial buildings	1,630	132,025	1
Action 3.3	develop and implement Commercial Energy Conservation Ordinance	5,164	105,152	2
Action 3.7	energy efficiency financing program for single-family homes	181	40,248	3
Action 3.8	offer energy efficiency financing program for multiple-family homes	126	33,617	4
Action 5.2	offer renewable energy financing program for commercial buildings	10,768	22,822	5
Action 6.3	improve construction and demolition debris program	1,953	15,634	6
Action 4.2	continue to implement private development green building ordinance for commercial buildings	4,493	77,925	7
Action 5.3	add solar requirement into private development green building ordinance	2,980	24,660	8
Action 4.1	continue to implement private development green building ordinance for residential buildings	979	18,836	9
Action 1.8	prioritize traffic-flow management practices to reduce idling time	23,061	21,875	10
Action 3.1	develop and implement Residential Energy Conservation Ordinance for single-family homes	639	39,304	11
Action 3.2	develop and implement Residential Energy Conservation Ordinance for multiple-family homes	983	33,033	12
Action 6.2	increase participation in food-scraps collection programs	1,495	11,963	13
Action 6.1	increase participation in recycling programs	15,916	38,216	14
Action 5.1	offer renewable energy financing program for residential buildings	850	2,149	15
Action 1.4	expand public transit services to encourage reductions in vehicle travel	3,062	15,199	16
Action 5.4	increase portion of electricity provided by renewable energy		30,779	17
Action 1.2	assist businesses in establishing car share / bike-share programs	416	7,283	18
Action 6.6	encourage waste reduction and promote recycling participation at multi-family properties	253	304	19
Action 7.1	maximize carbon sequestration within City		284	20
Action 1.1	assist businesses in providing commuter benefits programs	2,286	8,106	21
Action 1.5	continue to implement bike master-plan	2,419	7,610	22
Action 1.3	update parking policies to encourage reduction in vehicle travel		9,471	23
Action 1.6	develop and implement pedestrian master-plan	1,394	7,121	24
Action 6.4	ban certain materials from landfills	2,487	2,986	25
Community-wide Actions - potential emissions reductions not calculated, or City does not have direct control over implementation				
Action 3.4	actively participate in low-income weatherization programs	emissions reductions not quantified		1
Action 2.2	collaborate the state and federal government on policies that promote low-carbon vehicles and low-carbon fuels	129,060	532,735	2
Action 2.1	provide incentives for low-carbon vehicles and low-carbon fuels	129,060	532,735	3
Action 1.10	align zoning policies to minimize vehicle travel	emissions reductions not quantified		4
Action 3.5	promote a voluntary commitment for businesses and residents to reduce energy consumption	emissions reductions not quantified		5
Action 6.7	prefer waste management strategies that maximize the useful value of waste streams	emissions reductions not quantified		6
Action 6.5	require residents / businesses to participate in recycling programs	emissions reductions not quantified		7
Action 1.11	increase availability of affordable housing for people employed in Hayward	emissions reductions not quantified		8
Action 9.1	create green-portal website	emissions reductions not quantified		9
Action 9.2	develop and implement plan to engage residents in emissions reductions activities	emissions reductions not quantified		10
Action 9.3	develop and implement plan to engage businesses in emissions reductions activities	emissions reductions not quantified		11
Action 3.6	promote use of home energy monitors	emissions reductions not quantified		12
Action 1.7	update the Circulation Element of the General Plan to evaluate expansions of appropriate modes of transit	emissions reductions not quantified		13
Action 1.9	encourage high density, mixed-use, smart-growth development in areas near public transit stations	emissions reductions not quantified		14
Action 1.12	incentivize filling local jobs with local residents	emissions reductions not quantified		15
Action 8.1	*Place holder - no actions defined for climate change adaptation*	not evaluated		--

Note: Emissions reductions were not estimated for several actions due to their overlapping effects with other actions and to prevent double-counting

Municipal Actions – listed in order of priority

Table 2: Proposed Actions for reducing municipal emissions: listed in order of priority

Action Number	Short Description	Estimated Annual Emissions Reductions (metric tons CO2e) *assumes Scenario 2 fuel economy and renewable electricity generation and that program goals are achieved		Priority
		2020	2050	
Municipal Actions - potential emissions reductions calculated and City has direct control over implementation				
Action 3.10	upgrade streetlights to LEDs	969	1054	1
Action 2.3	procure fuel-efficient and low-carbon fuel vehicles for municipal fleet	54	108	2
Action 3.12	audit city buildings and identify energy savings opportunities	330	1542	3
Action 3.11	prepare and implement energy conservation plan for municipal buildings	330	1542	4
Action 2.4	negotiate alternative-fuel and fuel economy requirements into new contracts and franchise agreements	54	108	5
Action 6.9	implement food scraps collection programs in city buildings	73	163	6
Action 5.5	audit city buildings and identify buildings best-suited for solar	76	2227	7
Action 5.6	install renewable generation on municipal property	76	2227	8
Action 4.3	continue to implement municipal green building ordinance	47	328	9
Action 7.2	maximize carbon sequestration on municipal property	5	32	10
Action 6.8	implement recycling programs in city buildings	27	28	11
Municipal Actions - potential emissions reductions not calculated, or City does not have direct control over implementation				
Action 1.13	provide commuter benefits to government employees	emissions reductions not quantified		1
Action 1.15	prefer facilities with convenient access to public transit	emissions reductions not quantified		2
Action 9.4	offer climate education programs to City employees	emissions reductions not quantified		3
Action 4.4	ensure new city buildings are built with photovoltaics and solar hot-water whenever possible	emissions reductions not quantified		4
Action 9.6	when awarding contracts, request applicants provide information about sustainability practices	emissions reductions not quantified		5
Action 9.5	demonstrate leadership by setting municipal reduction targets. Work to achieve these targets	emissions reductions not quantified		6
Action 6.10	develop environmentally friendly purchasing program	emissions reductions not quantified		7
Action 1.14	develop car-share and/or bike-share program for city employees	emissions reductions not quantified		8
Action 8.2	*Place holder - no actions defined for climate change adaptation*	emissions reductions not quantified		9

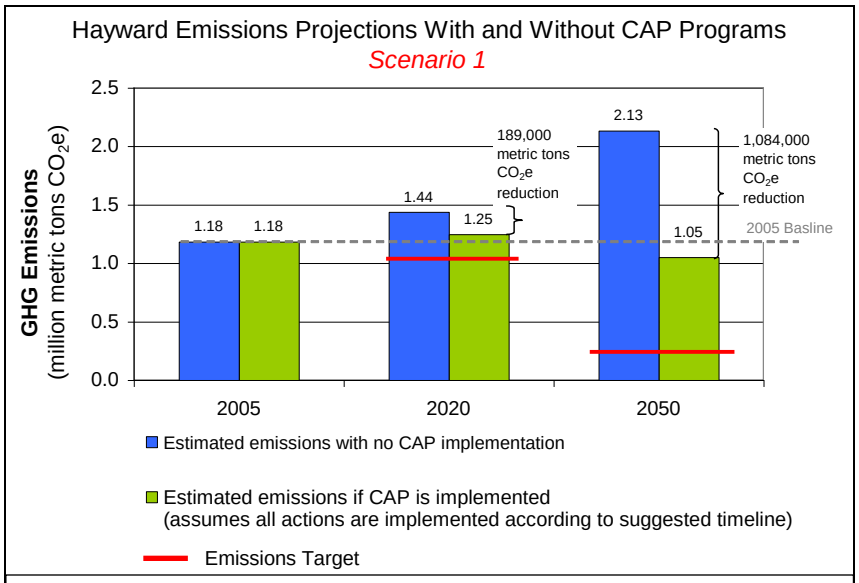
Note: Emissions reductions were not estimated for several actions due to their overlapping effects with other actions and to prevent double-counting

Achieving Target through Cumulative Emissions Savings

No single action will enable Hayward to meet its long-term emissions reduction targets. To meet the target, Hayward will have to implement a wide range of actions in each of the major emissions producing sectors – transportation, energy use in buildings, and solid waste management. Figure 5 shows Hayward's emissions in 2005, the emissions projections for 2020 and 2050, and how emissions savings with CAP implementation will help Hayward meet the 2020 and 2050 emissions targets. Appendix B includes tables with each action and the estimated emissions reductions expected for the year 2020 and 2050.

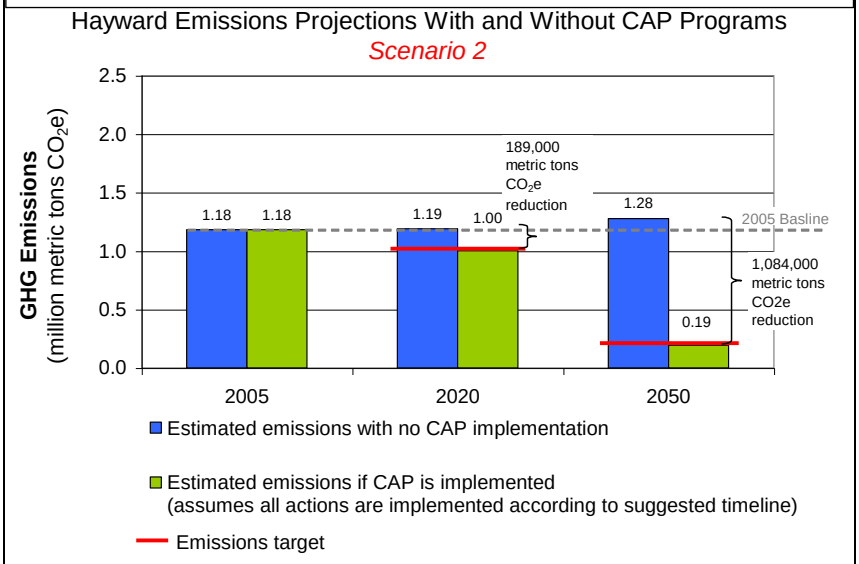
If Hayward designs the recommended CAP programs so they achieve the programs goals, as presented in Appendix C, and implements the CAP programs according to the suggested timetable, as presented in Appendix E, the estimated annual emissions savings will be approximately 189,000 metric tons CO_2e and 1,084,000 metric tons CO_2e in 2020 and 2050, respectively. Figure 5 shows estimated emissions with and without implementing the Climate Action Plan. The top chart shows these emissions savings subtracted from the Scenario 1 case where the average fuel economy remains at 19.1 mpg indefinitely and the amount of renewable energy generation will remain constant at about 12% renewable generation. The bottom chart shows emissions savings subtracted from the Scenario 2 BAU case where fuel economy and percent renewable generation increase over time. See Section 3 for a detailed explanation of Scenario 1 and Scenario 2 assumptions.

Although Hayward's emissions target is to reduce emissions to 12.5 percent below the 2005 level by 2020, the City will have to reduce emissions by more than just 12.5 percent. If Hayward does nothing, or continues on the business-as-usual path, GHG emissions will continue to increase in proportion to population, number of jobs, and housing availability. To meet targets, Hayward will have to prevent the expected emissions growth, reduce emissions back to 2005 levels, and then eliminate another 12.5 percent of emissions. For this reason, emissions reductions are subtracted from the projections, not the 2005 baseline. Appendix B includes a table with each action and the estimated emissions reductions expected for the years 2020 and 2050.



Scenario 1

- ICLEI growth rates
- Fleet average fuel economy remains constant at 19.1 MPG for gasoline vehicles and 6.2 MPG for diesel vehicles
- Percent renewable electricity generation remains constant at 12 percent



Scenario 2

- ICLEI growth rates
- Fleet average fuel economy increases:
- gasoline vehicles: 25 MPG by 2020, 45 MPG by 2050
- diesel vehicles: 6.8 MPG by 2020, 9 MPG by 2050
- Percent renewable electricity generation increases:
  - 33 percent renewable generation by 2020
  - 40 percent renewable generation by 2050

Figure 5: Projected annual City-wide emissions with and without CAP programs
Source: ICLEI, City Analysis

Meeting the 2020 target

Given the estimated quantity of emissions reductions possible if Hayward achieves all program goals and implements programs according to the suggested timeline as outlined in Appendix C, the City will likely meet its 2020 target. However, to achieve the program goals, Hayward will have to be diligent. Actively contributing to regional and state-wide initiatives will help Hayward leverage other jurisdictions' efforts and allow the City to build on regional efforts to develop strategies that will be useful in other communities as well.

Meeting the 2050 target

To achieve the 2050 target, Hayward will have to meet aggressive long-term goals including:

- Reduce VMT of passenger vehicles to 30 percent below the projected emissions level[6]
- Reduce VMT of diesel vehicles (heavy trucks) by 10 percent below projected emissions level
- Increase average fuel economy of passenger vehicles to 75 mpg
- Increase average fuel economy of diesel vehicles to 11.5 mpg
- Supply 100 percent of electricity from renewable sources
- Reduce electricity consumption to 65 percent below emissions projections
- Reduce natural gas consumption to 50 percent below emissions projections
- Eliminate emissions from methane produced from waste decomposition

These goals are not out of reach. The technology required to meet these goals is available today. Electric vehicles are rolling off of assembly lines, and renewable power is becoming more common. Appliances, like TVs, refrigerators, fans, toasters, stereos, hair dryers, and drills are becoming increasingly more energy efficient. Developing technology is not the biggest challenge to achieving the 2050 goal. The biggest challenge is creating the conditions for the existing technologies to penetrate the culture. Hayward faces the challenge of using its resources to help direct its residents and businesses to embrace new technologies and new ways of thinking about our collective impact on the climate. Hayward can help achieve the 2050 goals by actively participating in local, regional, state, and federal initiatives that aim to reduce emissions from the transportation, energy, and solid waste sectors.

The transportation-related goals listed above are stated in terms of reducing VMT in conventional gasoline- and diesel-powered vehicles and increasing the fuel economy of gasoline-powered passenger vehicles and diesel-powered heavy trucks. The CAP did not attempt to evaluate the climate impacts of switching to lower-carbon fuels or transitioning to electric or hybrid vehicles. However, equivalent emissions reductions can be achieved using a number of different vehicle technologies. In the coming decades, it is very likely that there will be more variety in the types of vehicles on the road. It is difficult to predict which vehicles will be most popular, but it is certain that vehicle manufactures will explore offering electric, hybrid, plug-in hybrid, compressed natural gas vehicles, diesel and biodiesel vehicles, and (if there is a breakthrough in fuel-cell technology) hydrogen vehicles. Though the CAP did not attempt to quantify the emissions impacts of these alternative vehicles, the City should work to promote a transportation plan that will result in emissions savings, regardless of technologies deployed.

Hayward should re-evaluate the CAP regularly to incorporate new technologies and new ideas that are not included in this iteration of the plan, including adaptation strategies and programs. In the future there may be more effective ways to sequester carbon, or better energy efficiency or renewable energy technologies that Hayward would benefit from adopting. Technology improvements to track include

[6] If Hayward achieves its long-term VMT reduction goal and its long-term fuel economy goal, the City will reduce overall gasoline use by over 78 percent below emission projections.

advances in battery technology (which could be applicable to both renewable energy and electric vehicles), higher efficiency and lower cost solar panels, advances in wind turbines to reduce noise, fuel-cell technologies, waste management strategies that convert waste streams to renewable and non-renewable energy, and advances in energy- efficient appliances, lighting, heating, and cooling. It is recommended that Hayward update its CAP at least once every 10 years to ensure that the City is taking advantage of the most up-to-date technologies and the most effective methods for reducing community-wide emissions. When updating the CAP, Hayward should aim to identify specific technologies and operational practices that will enable the City to meet its long-term 2050 reduction target.

Cooperation with State and Federal agencies

The largest percentages of Hayward's GHG emissions are from vehicle use and from electricity and natural gas consumption. To be successful in meeting its emissions reduction goals, substantial reductions will be necessary from all of these sources. When looking at the estimated emissions reductions from various proposed actions, it becomes clear that a few critical actions can have a large impact on the reduction effort. For example, in the transportation sector, actions 2.1 and 2.2 - increasing the fuel economy of vehicles; and in the energy sector, action 5.3 - increasing the percentage of renewable energy used to generate electricity, are expected to result in more emissions reductions than other actions identified in the CAP.

These actions (actions 2.1, 2.2, and 5.3) are also the actions that the City has the least direct control over. Hayward does not have the authority to mandate fuel economy of vehicles sold in its jurisdiction, nor does it have the authority to increase the amount of electricity a utility produces from renewable sources. Hayward can, however, influence these federal and state-level decisions by acting in cooperation with other communities.[7] As vital components of Hayward's emissions reduction strategies, it is critical that Hayward do what it can to support the federal and state efforts to increase fuel economy and to increase the amount of electricity generated from renewable sources.

Perhaps the most important state or federal policy Hayward should actively advocate for is placing a price on carbon emissions. At the time of this writing, the country is beginning a debate on what federal-level carbon legislation will be most effective at reducing emissions. The discussion tends to focus on whether a cap-and-trade system or a carbon tax will be a more effective policy.[8],[9] Regardless of what policy makes it through the U.S. House and Senate (cap-and-trade, carbon tax, or something different), it is critical that carbon is assigned a monetary value. Further, the value of carbon needs to be set high enough so citizens and businesses make a concerted effort to reduce emissions. When the true value of carbon is realized, energy efficiency, renewable energy, alternative vehicles and alternative fuels, and advanced waste management projects will be cost competitive without state and federal incentive programs. It is recommended that the City of Hayward advocate for carbon policies that aim to help citizens and businesses realize the true value/impacts of carbon.

Implementing the Plan

Meeting the aggressive emissions reductions targets will require a team of key participants to come together with a unified vision and a collective motivation to achieve emissions reductions. Section 6 of

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[7] As discussed on pages 80-87 of the CAP, Hayward does have options for pursuing programs that may result in an increase of the renewable portion of electricity used in the City that would not depend on state or federal action. Hayward does have the option of participating in a Community Choice Aggregation program and thereby securing more electricity from renewable sources (see www.communitychoice.info or www.lgc.org/cca for information on Community Choice Aggregation) but Hayward does not have the authority to mandate the percent of electricity that PG&E produce from renewable sources.

[8] Yale Environmental 360. *Putting a Price on Carbon: An Emissions Cap or A Tax?*. May 7, 2009. http://e360.yale.edu/content/feature.msp?id=2148

[9] Thomas Friedman. *Show us the Ball.* New York Times Opposition and Editorial. April 8, 2009. Page A25 of New York edition. http://www.nytimes.com/2009/04/08/opinion/08friedman.html?_r=2

the CAP discusses recommendations for implementing the Action Plan. The major recommendations are listed below.

Recommendations for Implementing the Plan:

1. The City establish a Climate Action Management Team (CAM Team) to support and guide efforts to reduce emissions.
2. The City appoint a permanent Sustainability Coordinator who will, among other duties, coordinate the CAM Team, develop and implement programs/actions, and be responsible for monitoring and reporting on Hayward's progress toward meeting the long-term emissions reduction goals.
3. The City develop a protocol for annual reporting on progress towards meeting emissions targets. Reporting should be rigorous enough to provide an accurate analysis, but should not be so demanding that it takes away from efforts to reduce emissions.
4. The City develop a review process for evaluating the effectiveness of emissions reduction programs.
5. The CAM Team report annually to the City Council on progress towards meeting emissions reduction goals.
6. The City encourages individual businesses and business groups to participate in efforts to reduce GHG emissions by the commercial sector.
7. The City encourages residential sector developers, multi-family building owners, and residents to participate in reducing emissions by the residential sector.
8. When prioritizing actions, the City weigh the following factors: estimated emissions reductions, cost of implementation, ease of implementation, the time required for the program to reach full implementation, and financial benefits or cost savings.
9. The City create a financial plan for the climate action programs that takes into consideration the costs and staff resources needed throughout the implementation period.
10. The City evaluate alternative climate financing methods in order to provide adequate, reliable, and consistent long-term program funding.
11. The City complete a full emissions inventory every three to five years to measure and verify that emissions are actually decreasing over time.
12. The City collect information about and evaluate the effectiveness of climate programs on a regular basis.

Ongoing Measurement and Verification

The success of the long-term carbon reduction program depends on regular monitoring. Regular monitoring is important because it:

- Enables informed decision-making about climate-related programs for setting future priorities, determining appropriate program funding and scheduling, and identifying whether there is a need to adjust the program approach to ensure that the long-term emissions targets are being achieved.
- Provides credible and defensible data to prove that the community is meeting targets and can be held accountable for its commitment to reduce emissions.
- Prepares the City for GHG reporting requirements that are likely to emerge in the future.
- Recognizes the accomplishments of the community.

What to Measure

The CAP recommends that Hayward complete a full emissions inventory every three to five years to measure and verify that emissions are actually decreasing over time as planned. It is also recommended that Hayward collect other program-specific information on all of the individual programs that are contributing to the emissions reduction effort, so that each program can also be regularly evaluated. The

evaluations will inform City decision-making on appropriate future funding levels; help identify any need for adjustments to the program design, and enable the City to evaluate the effectiveness of the individual programs.

Voluntary Reporting

Hayward might consider participating in programs, such as the California Climate Action Registry (CCAR) and/or EPA's Climate Leadership program. There are several reasons to consider participation in one or more of these programs. First, it will provide the City with a mechanism to obtain independent third-party verification that the City's inventories are accurate, complete, and diligent. Second, following standard protocols will ensure that the City's inventory is consistent, and therefore comparable with the inventories of other participants. Third, it will provide the City with an incentive to complete inventories on a regular basis. Finally, many of these organizations offer a variety of services to help members calculate emissions and meet reduction targets, and Hayward will have access to these services if the City becomes a member.

Appendices

The appendices of the Plan include:

Appendix A:	Baseline Emissions Detailed Reports
Appendix B:	Estimated Emissions Reductions
Appendix C:	Methodology Report: Calculation of Estimated Emissions Reductions
Appendix D:	Action Prioritization
Appendix E:	Recommended Implementation Timing
Appendix F:	Energy Efficiency and Conservation Block Grant Information
Appendix G:	California Executive Orders and Legislation Pertaining to Climate Change
Appendix H:	Recommended Changes to the Hayward Municipal Code
Appendix I:	Recommended Changes to to the Hayward General Plan
Appendix J:	Public Comments on the Draft Climate Action Plan

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List of Acronyms and Abbreviations

AB 32	Assembly Bill 32: California Global Warming Solutions Act of 2006
ABAG	Association of Bay Area Governments
ACCPP	Alameda County Climate Protection Project
APTA	American Public Transportation Association
BAAQMD	Bay Area Air Quality Management District
BART	Bay Area Rapid Transit
BAU	business-as-usual
CARB	California Air Resources Board
CAFE	Corporate Average Fuel Economy
CAP	climate action plan
CCAR	California Climate Action Registry
CCP	Cities for Climate Protection
CEC	California Energy Commission
CH_4	methane
City	city of Hayward
CIWMB	California Integrated Waste Management Board
CO_2	carbon dioxide
CO_2e	carbon dioxide equivalents
C&D	construction and demolition
DOE	Department of Energy
EPA	Environmental Protection Agency
GHG	greenhouse gas
GWh	Gigawatt hour
HOV	high occupancy vehicle
HUSD	Hayward Unified School District
ICLEI	Local Governments for Sustainability
IPCC	Intergovernmental Panel on Climate Change
MPG	miles per gallon
MTC	Metropolitan Transportation Commission
MW	megawatt
MWh	megawatt hours
N_20	nitrous oxide
NASA	National Aeronautics and Space Administration
O_3	ozone
O&M	operation and maintenance
PG&E	Pacific Gas & Electric Company
PV	photovoltaic
RPS	Renewable Portfolio Standards
StopWaste.Org	Alameda County Waste Management Authority & Recycling Board
UNFCC	United Nations Framework Convention on Climate Change
VMT	vehicle miles traveled
VOC	volatile organic compound
WARM	Environmental Protection Agency Waste Reduction Model
WCI	Western Climate Initiative

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Section 1 - Introduction

Climate Protection in Hayward

The City of Hayward and its citizens recognize that climate change poses a potential threat to the community and to the larger environment. The City and its citizens also recognize that activities taking place within the City result in the release of the heat-trapping global warming gasses that contribute to climate change. Hayward, therefore, wishes to take a stance against climate change by reducing the amount of greenhouse gas (GHG) emissions from activities taking place within the City.

Hayward made this intention clear in 2005, when the Mayor of Hayward signed the U.S. Conference of Mayors Climate Protection Agreement which states, "We will strive to meet or exceed Kyoto Protocol targets for reducing global warming pollution by taking actions in our own operations and communities." [10] In June 2006, the City joined ten other local governments in Alameda County participating in the Alameda County Climate Protection Project (ACCPP). By joining ACCPP, Hayward embarked on an ongoing coordinated effort to reduce the emission of gasses that cause global warming. ACCPP was launched by the Alameda County Waste Management Authority & Recycling Board (StopWaste.Org) in partnership with the Alameda County Conference of Mayors and ICLEI - Local Governments for Sustainability (ICLEI).

The Climate Action Plan (CAP) provides a roadmap for achieving a measurable reduction in GHG emissions, so adopting the CAP will be a discernible step towards emissions reductions. The CAP recommends GHG emissions targets that will align Hayward's reduction targets with those of the State of California and presents a number of strategies that will make it possible for the City to meet the recommended targets. The CAP also suggests best practices for implementing the Plan and makes recommendations for measuring progress.

The CAP will be implemented over an extended period of time. Hayward recognizes that it may not be possible to implement some of the ideas presented in the Plan with the current economic conditions. Nevertheless, it is important to keep ideas on the table that could make a cost-effective contribution to reducing emissions at some future time in the life of the Plan. Many of the actions recommended in the CAP will require significant staff analysis, public input, and consideration by the City Council before they can be implemented.

Section 5 of the Draft Climate Action Plan presents estimated emissions reductions from implementing the various actions. These estimations are as accurate as possible given the data available at the time of writing. The estimates are useful in that they provide a general picture of the relative impact of the various programs. However, many factors will impact actual emissions reductions during the extended life of the Plan, and it is likely that actual reductions will vary from emissions reductions presented in the Plan. Readers are encouraged to accept these values as rough estimates that will likely change as more accurate data becomes available.

[10] US Conference of Mayors Agreement http://www.usmayrs.org/climateprotection/documents/mcpAgreement.pdf

Note: Emissions reductions were not estimated for several actions due to their overlapping effects with other actions and to prevent double-counting

Purpose of Plan

The purpose of the emissions reduction plan is to provide direction for the community's efforts to reduce emissions in the coming decades. The plan recommends specific actions the City can take to meet its emissions reductions targets. With the plan as a framework, the City can make informed decisions about which actions should be implemented immediately, and which actions are better suited for implementation at some time in the future.

Because the plan is intended to be implemented over an extended period, it is important to realize that the costs and benefits of implementing specific actions will change over time due to changes in economic conditions, new and/or improved technology, changes in public opinion, or for other reasons. Many of the recommended actions will require public investments that may be difficult to justify in the current economic climate, but may be easier to justify at some future time. This means that although a proposed emissions reduction action may seem impossible to implement today, it should not be eliminated from the list forever. Instead those actions can be retained as potentially valuable reduction actions that may be implemented at some time in the future.

How the Draft Climate Action Plan was Developed

City staff worked with members of the community, elected officials, and representatives from various departments within the City government to develop the CAP. In July 2008, the City hosted a public workshop to solicit ideas for the Plan. Based on feedback received from the community during and after the workshop, the City developed a list of recommended actions. This list of potential actions was also reviewed with City staff and the City Council Sustainability Committee, and the proposed actions were analyzed in more detail. Emissions savings resulting from these actions were estimated, and assessments made of how easy or difficult it would be to implement each action. A draft was reviewed by City staff in early 2009, and is being circulated for public comment in February and March 2009. A community workshop to discuss the Draft CAP and to solicit feedback from the community was held on March 19, 2009.

Action Plan Format and Calculation Methods

Plan Format

The Draft Climate Action Plan recommends nine strategies to guide the City's effort in reducing GHG emissions. Each strategy is comprised of several action items. It is anticipated that each of these action items will turn into a multiple-year program that will require its own budget and staff resources to develop and implement. CAP offers direction in the form of reference material and a recommended implementation strategy, but does not attempt to design programs or policies.

Of the nine strategies presented in the CAP, two strategies focus on reducing emissions from transportation and three strategies address emissions reductions from energy. One strategy focuses on reducing solid-waste-related emissions, and one on maximizing carbon sequestration within the City. The final CAP will contain a strategy on climate change adaptation, but this strategy is not included in this draft of the CAP. The remaining strategy focuses on community outreach and education.

Prioritizing Actions for Implementation

The order that strategies and actions are presented in the CAP does not correlate with how the actions and strategies should be prioritized during the implementation phase of the plan. To achieve the emissions target, the City will likely have to implement all the actions in this plan, but the order in which

actions are implemented will depend on which programs are socially, politically, and economically feasible at various times throughout the implementation period. The order in which actions are implemented will also depend on how much it will cost and whether there is funding available. Action prioritization is discussed in more detail in Section 6 of the CAP. Appendix D also presents information on action prioritization.

Estimating Emissions Reductions

Section 5 of this report presents estimated emissions reductions of proposed action. It is hard to predict how effective a program will be before the program has been developed and without knowing the amount of resources that will be dedicated to the program. To address this difficulty, the City set realistic program goals that planners can use when designing programs. The potential emissions reductions were then calculated making an assumption that programs will be designed so that program goals will be achieved. Program goals were established by evaluating programs that other cities have in place and considering how the program might impact Hayward differently.

These estimates presented in the CAP are as accurate as possible given the data available at the time the Plan was prepared. However, many factors that are presently unknown will impact actual emissions reductions. The estimated emissions reductions provide a general picture of the relative benefits of the various actions.

Science of Climate Change

The Earth's atmosphere is naturally composed of a number of gases that act like the glass panes of a greenhouse, retaining heat to keep the temperature of the Earth stable at an average temperature of 60ºF; hence, the term "greenhouse gases." Carbon dioxide (CO_2) is the most prolific of these gases. Other contributing gases include methane (CH_4), nitrous oxide (NO_2), ozone (0_3) and halocarbons. Without the natural warming effect of these gases, the average surface temperature of the Earth would be around 14ºF.

However, recently elevated concentrations of these gases in the atmosphere have had a de-stabilizing effect on the global climate, fueling the phenomenon commonly referred to as global warming. The global average surface temperature increased during the 20th century by about 1°F. According to NASA scientists, the 1990s were the warmest decade of the century, and the first decade of the 21st century is well on-track to be another record-breaker. Analyses from the Intergovernmental Panel on Climate Change (IPCC), the international organization tasked with investigating the causes and effects of climate change, indicate that with 90 percent certainty, human activities are contributing to global warming.[11]

The climate and the atmosphere do not react in a linear fashion to increased greenhouse gases. This means that we cannot easily predict the specific degree of warming that each ton of carbon dioxide emitted. The Earth's climate has a number of feedback loops and tipping points that scientists fear will accelerate global warming beyond the rate at which it is currently occurring. For example, as CO_2 emissions have increased in recent years, the oceans have been absorbing a significant portion of those gases, but as the oceans continue to absorb CO_2, scientists anticipate they will reach a saturation point, after which each ton of anthropogenically emitted CO_2 will have a more substantial impact.[12]

[11] Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: "Climate Change 2001: The Scientific Basis."
[12] Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: "Climate Change 2001: The Scientific Basis."

Another example of this compounding effect can be found in the polar ice caps. Ice is highly reflective and acts effectively like a giant mirror, reflecting the sun's rays back into space. As the planet warms and some of this ice melts away, a darker land or ocean surface is revealed. This darker surface tends to absorb more heat, accelerating the speed at which the planet warms with each ton of greenhouse gas emitted.

Impacts of Climate Change

Global Impacts

In addition to causing an increase in average global surface temperature, rising levels of greenhouse gases have a destabilizing effect on local temperatures and micro-climates, and on other natural systems. According to the Intergovernmental Panel on Climate Change, surface temperatures are on course to increase by between 2.5 and 10.5ºF by the year 2100, with regions in the northern parts of North America and Asia heating by 40 percent above the mean increase.[13] The increase in the temperature of the oceans is projected to also increase the severity and frequency of both storms and drought, which, along with decreased snow pack, may disrupt natural ecosystems, agriculture, and water supplies.

Snow cover is reported to have decreased by 10 percent in the last forty years. Average sea levels have raised between 1/3 and 2/3 of a foot over the course of the 20th century and are projected to rise by at least another 1/3 of a foot, and possibly up to almost three feet by the year 2100. These changes may cause coastal infringements on such a large scale that they may lead to not only significant environmental and ecosystem disturbances, but also major population displacement and economic upheaval.[14]

Local Impacts

While climate change is a global problem influenced by an array of interrelated factors, climate change is also a local problem with serious impacts foreseen for California, the Bay Area, and Hayward. Per executive order S-03-05, which was signed in June 2005, California EPA reports biannually on the impacts of global warming, including impacts to water supply, public health, agriculture, the coastline, and forestry, on California. Reports are posted on the California Climate Change Portal.[15]

Sea level rise

According to the Pacific Institute, over the past century sea level has risen nearly 8 inches along the California Coast. Under medium to medium-high GHG emissions scenarios, sea level is expected to rise another 1 meter to 1.4 meters by 2100. A 1.4 meter sea level rise would put over 480,000 Californian's at risk of flooding: 66,000 of these at-risk individuals are located in Alameda County.[16] Sea level rise would result in the erosion of beaches, bay shores and river deltas, marshes and wetlands, and would increase the salinity of estuaries, marshes, rivers and aquifers.[17] This increased salinity has the potential to damage or destroy crops in low-lying farmlands, and have serious impacts on water supplies. Infrastructure at or near sea level, such as harbors, bridges, roads, wastewater treatment plants, and even the San Francisco International and Oakland International Airports are at risk of damage.

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[13] Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: "Climate Change 2001: The Scientific Basis."
[14] Intergovernmental Panel on Climate Change (IPCC) Third Assessment Report: "Climate Change 2001: The Scientific Basis."
[15] California Climate Change Portal. http://www.climatechange.ca.gov
[16] CEC Climate Change Center. Pacific Institute. *Impacts of Sea-Level Rise on the California Coast*. Draft Paper. March 2009. CEC-500-2009-024-D. http://www.pacinst.org/reports/sea_level_rise/report.pdf
[17] Neumann, James E. for the Pew Center on Global Climate Change. "Sea Level Rise & Global Climate Change: A Review of Impacts to the US Coasts." February 2000.

The Pacific Institute has modeled the impact of a sea level rise on California coastal zones. Figure 1 shows that Hayward would be at risk. Critical infrastructure such as hospitals, schools, wastewater treatment facilities, and roads would be subject to flooding. A number of EPA-monitored contaminated sites would also be in the flood zone.

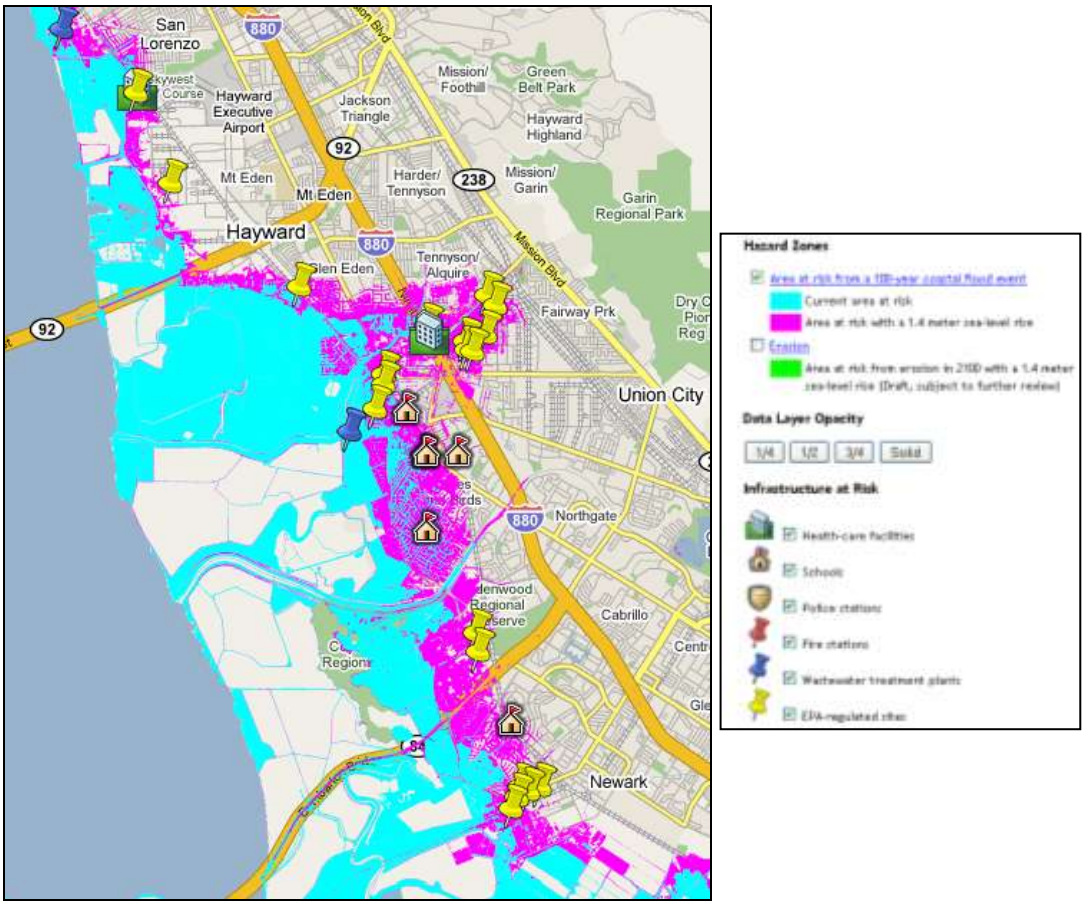

Figure 1: Hayward Land Areas Affected by Sea Level Rise
Source: Pacific Institute. *Impacts of Sea Level Rise on the California Coast.* Interactive Map. Accessed May 8, 2009. http://www.pacinst.org/reports/sea_level_rise/gmap.html

Natural disasters

Climate models predict a 4ºF temperature increase in the next 20 to 40 years, with an increase in the number of long dry spells, as well as a 20-30 percent increase in precipitation in the spring and fall. More frequent and heavier precipitation may cause flooding and mudslides, which would result in considerable costs in damages to property, infrastructure and even human life. Heavy rains during the winter of 2005 offer a glimpse of the potential costly and disruptive effects of such precipitation. In addition, the increase of wildfires due to continued dry periods and higher temperatures is another expected impact of continued climate change. In these conditions, fires burn hotter and spread faster.

Impacts on water supply

Water quality and quantity are also at risk as a result of changing temperatures. With warmer average temperatures, more winter precipitation will fall in the form of rain instead of snow, shortening the winter snowfall season and accelerating the rate at which the snowpack melts in the spring. Not only does a faster snow melt increase the threat for spring flooding, it will decrease the Sierras' ability to serve

as California's natural water storage system, resulting in decreased water availability for agricultural irrigation, hydro-electric generation, and the general needs of a growing population. Current projections forecast that the Sierra snowpack could decline between 70 and 90 percent in the next 100 years.[18]

The decrease in snow-pack is particularly relevant in the state of California and the Bay Area, as the Sierra snow-pack provides approximately 80 percent of California's annual water supply, and it is the origin of the Tuolumne River, the primary source of water for the San Francisco regional water system. Figure C-2 was provided by the Union of Concern Scientists for the California Climate Action Team Report (2006).

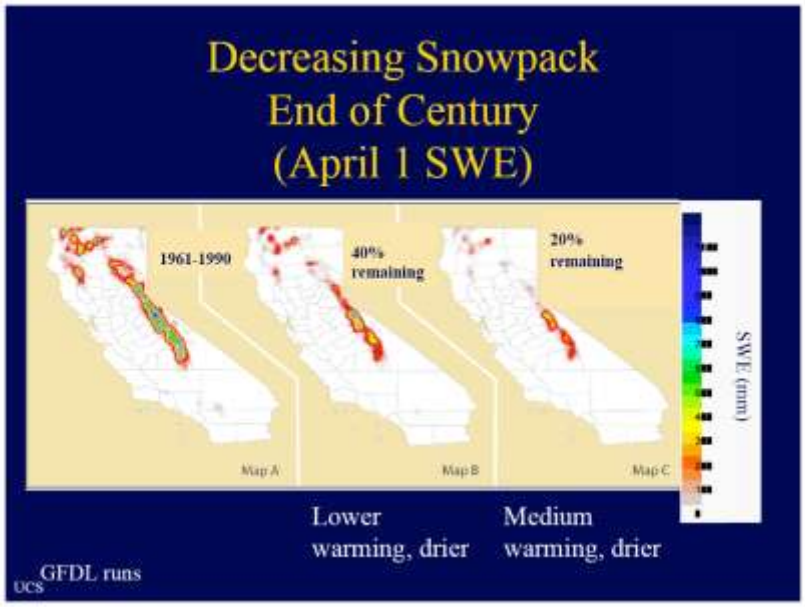

Figure 2: Decreasing Snowpack in California
Source: Union of Concern Scientists

Impacts on plants and vegetation

Native plants and animals are also at risk as temperatures rise. Scientists are reporting more species moving to higher elevations or more northerly latitudes in response. Increased temperatures also provide a foothold for invasive species of weeds, insects and other threats to native species. The increased flow and salinity of water resources could also seriously affect the food web and habitat for fish that are of both economic and recreational interest to residents. In addition, the natural cycle of plant's flowering and pollination, as well as the temperature conditions necessary for a thriving locally adapted agriculture may also be affected, with perennial crops such as grapes perhaps taking years to recover. In California, the impacts of climate change on agriculture are estimated to be $30 billion by the Farm Bureau, mostly due to changes in chill hours required per year for cash crops.

Public health impacts

Warming temperatures and increased precipitation may also encourage mosquito-breeding, thus engendering diseases that come with mosquitoes, such as the West Nile Virus, a disease of growing

[18] California Climate Change Center. 2006.

concern in our region. Heat waves are also expected to have a major impact on public health and be a significant future factor in mortality.

Increased temperatures also pose a risk to human health when coupled with high concentrations of ground-level ozone and other air pollutants, which may lead to increased rates of asthma and other pulmonary diseases. Furthermore, anticipated increases in the number and severity of hot days place significant portions of the population, particularly the elderly, young, those already sick, and people who work outdoors, at increased risk for heat-stroke.

The incidence of bad air days in California's urban areas has also increased, mostly on hot summer days. On hot days, ground level ozone can build up to levels that violate federal and state health-based standards. In the summer of 2006, the Bay Area Air Quality Management District (BAAQMD) registered eleven Spare the Air days and exceeded the California 1-hour standard for ozone (set at 90 ppb) eighteen times.

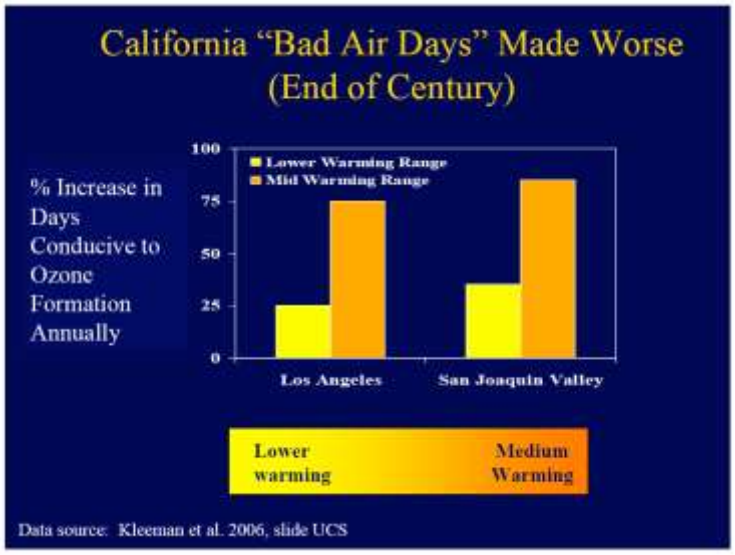

Figure 3: California Bad Air days
Source: Union of Concern Scientists

Given that climate change has local repercussions and effects on weather, water resources, ecosystems, public health, infrastructural stability and economic vitality, local governments have a vested interest in mitigating the amount of greenhouse gases being produced by their communities.

How Climate Change is Being Addressed

International Action

The United Nations Framework Convention on Climate Change (UNFCC) leads international efforts to investigate and combat climate change. In 1992, UNFCC hosted a summit held in Rio de Janeiro, Brazil and facilitated the creation of an international treaty aimed at achieving "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."[19]

[19] United Nations Framework Convention on Climate Change (UNCFF). www.unfccc.int

Five years later, the UNFCC brought nations together again to draft the Kyoto Protocol. The Protocol established commitments for industrialized nations to reduce emissions of six greenhouse gases (carbon dioxide, methane, nitrous oxide, sulfur hexafluoride, hydrofluorocarbons, and perfluorocarbons). The industrialized countries agreed to reduce their collective GHG emissions to 5.2 percent below 1990 levels by 2012. The Protocol also re-iterated the commitments of all member countries to adhere to the 1992 treaty to achieve "stabilization of greenhouse gas concentrations in the atmosphere at a level that would prevent dangerous anthropogenic interference with the climate system."

As of 2008, 182 parties had ratified the Kyoto Protocol.[20] Countries that have ratified the treaty are eligible to participate in a global carbon trading system wherein nations that exceed their allotted emissions quota for the five year period between 2008 and 2012 can purchase carbon credits from nations that have emitted less than their allotted emissions quota. By the end of the first commitment period of the Kyoto Protocol, which ends in 2012, a new international framework needs to have been negotiated and ratified for the next commitment period. The new framework will aim to deliver the stringent emission reductions that the Intergovernmental Panel on Climate Change (IPCC) has clearly indicated are needed.

Federal Action

As of April 2009, there are no U.S. federal policies in place that are specifically designed to reduce GHG emissions. By choosing not to ratify the Kyoto Protocol, the United States has taken a back seat in the international efforts to address climate change. Neither the executive or legislative branches of the government have passed legislation specifically aimed at reducing GHG emissions, nor has the EPA used its authority to regulate GHG emissions. However, EPA recently ruled that GHG emissions cause a threat to human health and the environment. This ruling sets the stage for the EPA to begin regulating GHG emissions, and indicates that the EPA will be taking action on the federal level to limit GHG emissions. It is still unclear what form this will take, but it is likely that future federal policies will also impact state and local climate policy.

In 2007, the federal government passed legislation that was not directly intended to reduce emissions, but will result in emissions reductions. The Energy Independence and Security Act of 2007 calls for an increase in the amount of biofuels by establishing a Renewable Fuel Standard that requires fuel producers to use at least 36 billion gallons of biofuel in 2022. The Act also increased Corporate Average Fuel Economy (CAFE) Standards to 35 MPG by 2020. This was the first statutory increase in CAFE standards since the standards were first instated in 1975. Although the intention of the Energy Independence and Security Act may be to decrease dependency on oil, the secondary effect is decreased emissions. Increasing fuel economy will prevent billions of gallons of fuel from being combusted, and without combusting fuel GHG emissions will not occur. Biofuels may also emit fewer GHGs than traditional fossil fuels, so there could be a climate benefit to using biofuels instead of fossil fuels.[21]

[20] The United States has not signed the protocol.

[21] H.R. 6: Energy Independence and Security Act of 200. http://www.govtrack.us/congress/bill.xpd?bill=h110-6.

Climate Change Resources

International	
ICLEI	www.iclei.org
Intergovernmental Panel on Climate Change	www.ipcc.ch
Pew Center on Global Climate Change	www.pewclimate.org
United Nations Framework Convention on Climate Change	unfccc.int
World Research Institute	www.wri.org
Federal	
U.S. EPA Climate Change	www.climatechange.ca.gov
Department of Energy, Energy Information Administration	www.eia.gov
Regional	
Western Climate Initiative	www.westernclimateinitative.org
State	
California Air Resources Board	www.arb.ca.gov
California Climate Action Registry	www.climateregistry.org
California Climate Change Portal	www.climatechange.ca.gov
California Energy Commission	www.energy.ca.gov
California Integrated Waste Management Board	www.ciwmb.ca.gov
Local	
Association of Bay Area Governments	www.abag.ca.gov
Bay Area Air Quality Management District	www.baaqmd.gov
City of Hayward	www.ci.hayward.ca.us
Metropolitan Transit Commission	www.mtc.ca.gov
Stopwate.org	stopwaste.org

California Action

California is making a concerted effort to reduce GHG emissions. This effort began in 1988 when Assembly Bill 4420 was chaptered thereby directing the California Energy Commission (CEC) to prepare and maintain the State's inventory of GHG emissions and to study the effects of GHG emissions. California lead the way in climate-related action by, among other things, setting aggressive state-wide emissions reduction targets, setting standards for the amount of electricity produced from renewable sources, and attempting to reduce the amount of GHG emissions from vehicles. There are a number of policies and programs that are helping shape California's efforts to reduce GHG emissions (see Appendix G for a list of California's executive orders and legislation that pertain to climate change). Some of the most influential pieces of legislation are described below.

California Global Warming Solutions Act of 2006 (AB 32): The California Global Warming Solutions Act of 2006, commonly referred to as Assembly Bill 32 or AB 32, instructed the California Air Resources Board (CARB) to establish a State-wide goal of reducing GHG emissions. After the bill was passed, State-wide emissions targets were established: the targets are to 2000 levels by 2010, to 1990 levels by 2020 and to 80 percent below 1990 levels by 2050. The 2050 target is consistent with what most climate scientists and the IPCC believe will be needed to avoid dangerous levels of global warming. AB 32 directed the CARB to establish a mandatory reporting system to track and monitor emissions levels, and required CARB to develop various compliance options and enforcement mechanisms. Emissions goals will be met by reducing energy consumption, improving fuel economy, establishing a State-wide enforceable cap on emissions which will be phased in starting in 2012, and a number of other actions. In December 2008, CARB adopted a scoping plan that outlines how it will guide California in efforts to achieve the 2020 reduction target.[22]

[22] California Air Resources Board, 2008. Draft AB 32 Scoping Plan. http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm

The Scoping Plan provides some guidance on how local government can address climate change and play an active role in reducing State-wide emissions. Specifically, the plan recommends that cities work to reduce emissions to 15 percent below 2008 levels by 2020. If Hayward adopts the CAP and achieves its targets, Hayward will reduce emissions to 20 percent below 2008 levels by 2020. The Scoping Plan also urges local government to align land-use, transportation, and housing plans to minimize vehicle commutes. Hayward has begun to do this and plans on continuing efforts to use local policy to reduce commuter travel.

Pavley Bill (AB 1493): Governor Gray Davis signed Assembly Bill 1493 into law on July 22, 2002. The bill is also known as the "Pavley Bill" in reference to assemblywomen Fran Pavley who introduced the bill. The Pavley Bill instructs CARB to "develop and adopt regulations that achieve the maximum feasible and cost-effective reduction of greenhouse gas emissions from motor vehicles." CARB subsequently established a regulation calling for carbon dioxide to be reduced by 22 percent by the 2012 model year and 30 percent by the 2016 model year. To legally enforce the standard, the U.S. EPA had to grant CARB a waiver. But in 2007 after almost two years of delay, the EPA rejected CARB's request for a waiver. The State of California has appealed EPA's decision, and legislators are hopeful that under the control of a new administration the EPA will finally grant CARB a waiver to enforce regulations on tailpipe emissions.

Mandatory Renewable Portfolio Standards (SB 1078, SB 107 and EO# S-14-08): Signed into law on September 12, 2002, SB 1078 required California's three major utilities – Pacific Gas & Electric, Southern Edison, and San Diego Gas & Electric – to produce a minimum amount of electricity from renewable sources. In September 26, 2006, SB 107 set a target of 20 percent renewable generation by 2020. In November 2008, Governor Schwarzenegger signed Executive Order # S-14-08 increasing the amount of renewable power generation to 33 percent by 2020.[23]

Regional Targets for Emission Reductions from Passenger Vehicles (SB 375): Governor Schwarzenegger signed SB 375 into law on September 30, 2008. The bill requires CARB to work with metropolitan planning organizations to set regional targets for reducing GHG emissions from passenger vehicles. Targets will be set for emissions in 2020 and 2035 and are expected to be in place by September 30, 2010. Setting regional targets and subsequently working to achieve these targets will require collaboration between local governments and regional planning organizations.

City of Hayward Action

Hayward has adopted ICLEI's Cities for Climate Protection methodology for managing GHG emissions. This performance-based methodology provides five milestones to assist local governments in developing and implementing local approaches for reducing global warming. The milestone process consists of the following five milestones:

1. Conduct a baseline emissions inventory and emissions forecast
Adopt an emissions reduction target
Develop a Climate Action Plan for reducing emissions
Implement policies and actions that will reduce emissions
Monitor and verify results

ICLEI assisted Hayward in completing a baseline emissions inventory (Milestone 1) in 2006, and subsequently updated the inventory in June 2008. The inventory is summarized in Section 2 of the Plan

[23] CPUC. California Renewable Portfolio Standards(RPS). http://www.cpuc.ca.gov/PUC/energy/Renewables/index.htm

and the full text of the inventory is available on Hayward's website (www.hayward-ca.gov). Milestone 2 (adopting targets) and Milestone 3 (develop Climate Action Plan) will be completed when this Climate Action Plan is adopted by the council. This report includes recommendations on how to achieve the fourth and fifth milestones: implementation and monitoring and verification.

Hayward's Existing Climate-Friendly Programs

In addition to signing on to ACCPP and developing this Climate Action Plan, the City of Hayward has already adopted a number of programs that will help reduce emissions. These programs include the Private Development Green Building Ordinance, the Environmentally Friendly Landscaping Guidelines, and policies encouraging transit-oriented development. The climate-friendly programs that existed at the time the CAP was written are detailed below.

Community-Wide Programs

- **Private Development Green Building Ordinance** – Establishes performance standards for new residential and non-residential buildings. The ordinance aims to improve water and energy efficiency and minimize construction and demolition waste. The ordinance, adopted on December 2, 2008, is available at: http://www.hayward-ca.gov/municipal/HMCWEB/GreenBuildingRequirementsforPrivateDevelopment.pdf

- **Environmentally Friendly Landscaping Guidelines –** Two sets of Guidelines (one for private homeowners and one for landscape professionals) were adopted in March 2009. The Guidelines establish environmental standards for landscaping projects that aim to minimize water use and solid waste, which will translate into GHG savings. An ordinance incorporating such standards is expected to be developed in 2009. The Guidelines are available at: http://www.hayward-ca.gov/citygov/meetings/cca/rp/2009/rp032409-07.pdf

- **Water Efficient Landscape Ordinance –** Applies to all new and existing development projects that contain 2,500 square feet or more of new or rehabilitated irrigated landscaped area, exempting certain projects, including those involving homeowner-provided landscaping for a single-family lot or for a private yard within a multi-family development with less than 5,000 square feet of irrigated landscaped areas that doesn't require a building or landscape permit, plan check or design review. The ordinance is available at this link: http://www.hayward-ca.gov/municipal/HMCWEB/WaterEfficientLandscapeOrd.pdf

- **Transit-Oriented Development** – Policy # 2 of the Land Use Element of the City's General Plan encourages mixed use (commercial and residential) and high density development along transit corridors. Smart growth principles call for well designed, high-density and mixed-use development near transit lines. This type of development minimizes travel in personal vehicles and thereby reduces emissions.

- **Bicycle Master Plan** – The Plan, updated in October 2007, provides long-term vision and direction for bicycle transportation and recreation in the City of Hayward. The Plan identifies needed facilities and includes an implementation strategy to facilitate construction of the recommended bikeway facilities. The Plan aims to enhance the quality of life in Hayward by facilitating more bicycling, which can reduce traffic congestion, vehicle exhaust emissions, noise, and energy consumption. The Plan also integrates the Hayward bicycle network into regional bicycle routes and identifies potential funding sources for improvements. The Plan is available at:

http://www.ci.hayward.ca.us/departments/publicworks/documents/2008/Final%20Hayward%20Bicycle%20Master%20Plan%20-%20October%202007%20-%20WITH%20MAPS.pdf

- **Construction and Demolition Debris Waste Reduction and Recycling Requirements –** Applies to all construction, demolition and/or renovation projects within the City with a permit valuation in excess of $75,000 as determined by the City's Building Official or designee, adjusted periodically for inflation, etc. The ordinance is available at this link: http://www.hayward-ca.gov/municipal/HMCWEB/ConstructionandDemolitionDebrisWasteReduction.pdf

Municipal Programs

- **Municipal Sector Green Building Ordinance** – Adopted on September 16, 2008, the ordinance establishes performance standards for new City-owned buildings and for major renovations of existing City-owned buildings. The ordinance aims to improve water and energy efficiency and minimize construction and demolition waste. The ordinance requires all covered projects (those exceeding 20,000 square feet or $5 million or a Public-Private Partnership) to be Leadership in Energy and Environmental Design (LEED) Silver Certified. The link to the ordinance is: http://www.hayward-ca.gov/municipal/HMCWEB/GreenBuildingRequirementsforMunicipalBuildings.pdf
- The link to the LEED program is: http://www.usgbc.org/DisplayPage.aspx?CategoryID=19

- **Municipal Bay Friendly Landscaping Ordinance –** This ordinance, adopted in January 2008, applies to landscaping projects or renovations of landscapes that equal or exceed $10,000 of landscape construction costs (including hardscaping) and are maintained by a City department or division or are developed as a Public-Private Partnership) The ordinance is available at this link: http://www.hayward-ca.gov/municipal/HMCWEB/BayFriendlyLandscaping.pdf

- **Eco-Friendly City Facilities Improvements –** Current practices include use of recycled content products in City facilities Solar Power Utilization on a Public Works facility, replacement of heating, ventilation and air conditioning (HVAC) equipment with more efficient equipment.

- **The Capital Improvement Program (CIP) –** annually identifies projects for improving the City's streets, water and sewer systems, public buildings, and other infrastructure needs. Several projects identified in the CIP will result in reductions in GHG emissions, such as heating and ventilation upgrades, re-roofing of buildings, installation of waterless urinals, and lighting upgrades. The complete CIP is available at: http://www.ci.hayward.ca.us/webware/Default.aspx?Message=1417&t=-1

- **Water Conservation –** Hayward expects to achieve total water conservation savings of about 750,000 gallons per day, by 2030, through a combination of indoor and outdoor conservation measures including rebates and educational resources. For details on City water conservation programs, visit: http://www.ci.hayward.ca.us/webware/Default.aspx?Message=372&t=-1

- **Eco-Friendly Practices in Water Treatment** – The Water Pollution Control Facility is the place where human solid waste is processed. A number of eco-friendly practices have been put in place, and more are being considered, to generate energy to operate the Facility. Current

practices include the capture, storage, and use of Methane Gas to power internal combustion engines. Improvements currently under consideration include the Future Use of Fuel Cells and Photovoltaic Solar System for Electricity. For more information, visit: http://www.hayward-ca.gov/webware/Default.aspx?Message=3377&t=-1

- **"Green" Practices in Vehicle Fleet Management –** As a Certified Green Business through Alameda County,[24] the Fleet Management Division of the Maintenance Services Department is continuously improving the fuel efficiency of its vehicle fleet. The Division implements programs such as recycling, energy conservation for both water and electricity, dry cleanup methods for hazardous material spills, and containment to prevent storm water drain contamination. For more details, visit: http://www.hayward-ca.gov/webware/Default.aspx?Message=3383&t=-1
-
- Deployment of Clean-Burning Alternative Fuel Vehicles for Separate Residential Collection of Garbage, Recyclables, and Organics – Beginning June 2007, the City's franchisee has used alternative fuel vehicles for the services listed.

- **Public Works Projects Require Recycling Construction and Demolition Debris** – All contractors retained by Public Works are required to recycle all construction and demolition debris generated as a result of their project and must provide documentation upon completion to obtain a 10 percent retainer.

[24] Alameda County Green Business Program. http://www.greenbiz.ca.gov/AboutUsAC.html

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Section 2 – Baseline Emissions Inventory

Section 2 provides a general introduction to the emissions inventory; followed by a summary of Hayward's emissions inventory and a discussion of Hayward's per capita emissions, relative to those of other communities. Section 2 ends with a forecast of how Hayward's emissions are expected to increase in the "business-as-usual" scenario where actions are not taken to reduce emissions.

Why conduct a baseline emissions inventory?

The baseline inventory provides an estimated appraisal of emissions for a given year. The inventory indicates the sources of Hayward's emission, and establishes a solid basis for comparisons between the City's current emissions and future emissions levels. Planners use the baseline inventory to set reasonable reduction targets and to prioritize actions to reduce emissions. To verify that emissions reductions have been achieved, planners can compare future inventories to the baseline inventory.

Findings from the baseline inventory, which was conducted for emissions in 2005, are summarized in the following pages. The community-wide inventory includes emissions from activities taking place within City limits, and the municipal inventory only includes emissions associated with Hayward's government operations. Appendix A presents more detailed information from Hayward's baseline inventory.

Calculation Method

ICLEI calculated Hayward's baseline emissions using its *Clean Air and Climate Protection* software.[25] This software estimates emissions derived from energy consumption, transportation, and solid waste generation within a community. The CACP software determines emissions using specific emissions factors (or coefficients) according to the type of fuel used. Emissions are aggregated and reported in terms of equivalent carbon dioxide units, or CO_2e. Converting all emissions to equivalent carbon dioxide units allows for the consideration of different greenhouse gases in comparable terms. For example, methane is twenty-one times more powerful than carbon dioxide in its capacity to trap heat, so one ton of methane emissions to equal to 21 tons of CO_2e. [26]

The emissions coefficients and methodology used in the software are consistent with national and international inventory standards established by the Intergovernmental Panel on Climate Change (1996 Revised IPCC Guidelines for the Preparation of National GHG Emissions Inventories), the U.S. Voluntary Greenhouse Gas Reporting Guidelines (EIA form1605), and, for emissions generated from solid waste, the U.S. EPA's Waste Reduction Model (WARM). The CACP software has been and continues to be used by over 200 U.S. cities and counties to quantify the reduction in GHG emissions.

ICLEI has provided Hayward with the most accurate inventory possible given the available data. However, calculating emissions with precision is difficult. The CACP model depends upon numerous

[25] ICLEI calculated Hayward's emissions for their Cities for Climate Protection Campaign which aims to assists cities to adopt policies and implement quantifiable measures to reduce local greenhouse gas emissions, improve air quality, and enhance urban livability and sustainability. More than 800 local governments participate in CCP. http://www.iclei.org/index.php?id=800

[26] Carbon dioxide is not the only gas that contributes to the greenhouse effect. Each greenhouse causes a discrete amount of heating. For example, one ton of CH_4 causes the same amount of warming as 21 tons of CO_2 (1 ton of CH_4 = 21 tons CO_2e). To simplify reporting, it is standard practice to report the carbon equivalent emissions as opposed to the actual emissions of each gas

assumptions, and it is limited by the quantity and quality of available data. With this in mind, it is useful to think of any specific number generated by the model as an approximation, rather than an exact value.

Hayward's detailed emissions inventory, which was first released in 2006, contains more information on ICLEI's calculation methods. The baseline inventory was updated in June 2008 to include emissions from travel on State highways, incorporate more accurate data from PG&E, and to reflect changes in ICLEI's method for calculating solid-waste-related emissions. The inventory was updated again in December to reflect further refinement in the methodology for calculating waste-related emissions, for predicting emissions in future years, and to provide the emissions in metric units. The previous versions of the inventory provided emissions in short tons, while the December 2008 version provides emissions in metric tons. A short ton is equivalent to 2,000 pounds, while a metric ton is equivalent to 1,000 kilograms. Most jurisdictions use metric units in their inventories, so the latest update allows Hayward to more easily compare its emissions with those of other cities.

Emission Sources Included in Hayward's Baseline Emissions Inventory

The inventory does not include all of the emissions generated in Hayward. Rather, the inventory includes emissions sources that can be accurately accounted for using the most current emissions estimation methodology. This means that all communities, not just Hayward, are limited in their ability to accurately estimate emissions from all sources. Over time, methodologies will improve and it will become possible to quantify and track more of Hayward's emissions sources. Even though the emissions inventory does not account for all emissions sources, this Plan suggests strategies to reduce emissions from some sources that do not have standardized methodologies for calculating emissions savings. The major emissions sources that are included in the baseline inventory are transportation, energy, and disposal of solid waste.

Transportation

Transportation-related emissions include emissions from gasoline and diesel vehicles traveling on local and State roads and highways. Emissions from the airport, from boats on the Bay, or from other mobile equipment such as lawn mowers and construction equipment are not included in the inventory.

Energy

Energy-related emissions include emissions from electricity and natural gas consumed within Hayward. These emissions are primarily attributed to consumption that occurs in residential and commercial / industrial buildings.

Waste

The methodology for calculating waste-related emissions is more limited than the methodology for calculating transportation or energy-related emissions. Hayward's baseline inventory only includes GHG emissions associated with landfilling organic waste. Emissions associated with non-organic materials are not included in the baseline inventory. This Plan suggests a number of strategies to reduce solid-waste-related emissions that are not included in the inventory. ICLEI is currently partnered with Stopwaste.org to update the inventory methodology for calculating waste-related emissions.

Summary of Inventory Results for 2005

Community Emissions Inventory Results

Figure 4 illustrates that in the base year 2005, the City of Hayward emitted 1,183,274 metric tons CO_2e. The transportation sector is the single largest source of emissions, contributing 62 percent of total emissions. Energy in the form of natural gas and electricity accounted for 33.5 percent of Hayward's emissions. The landfilled portion of the City's waste accounted for 4.4 percent of Hayward's 2005 emissions.

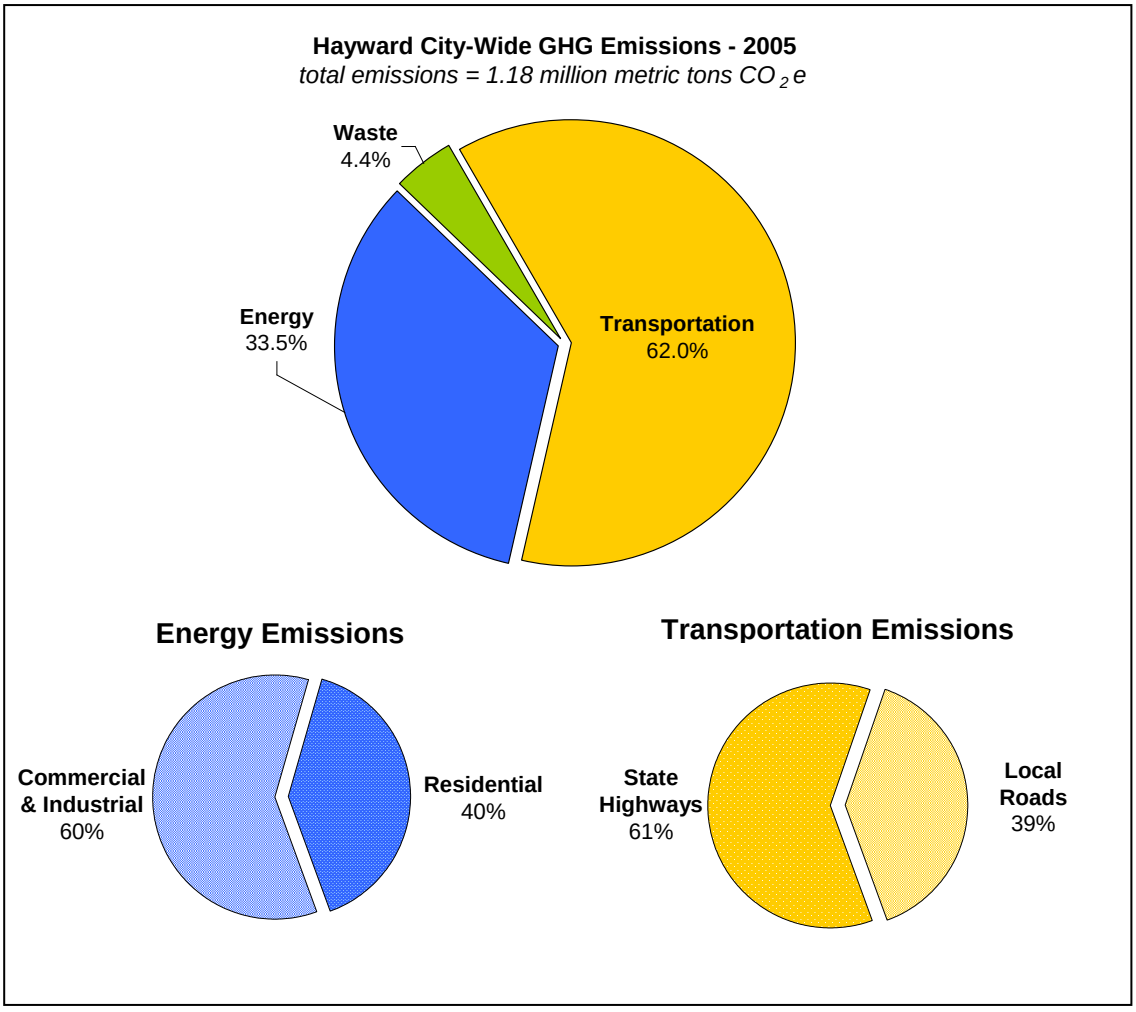


Figure 4: City-wide GHG emissions in 2005
Source: ICLEI

Transportation Emissions

Motor vehicles driven within the City's geographical boundaries on both local and State roads emitted approximately 734,087 metric tons of CO_2e in 2005. Thirty-nine percent of the emissions were attributed to travel on local roads and 61 percent were from travel on State highways. If emissions from state highways were not included in the 2005 baseline, total community-wide emissions would have been 736,123 metric tons of CO_2e as opposed to 1,183,278 metric tons CO_2e, and transportation-related emissions would have accounted for only 39 percent of the footprint. Through this lens, energy-related

emissions account for a larger portion, 54 percent, of the emissions impact that the City has direct control over (see Figure 5).

There is some debate as to whether emissions from state highways should be included in community inventories. Hayward followed ICLEI's recommendation and included state highways in its baseline inventory. Besides the benefit of standardizing inventory methodologies with other cities throughout the United States—and throughout the world—including emissions from state highways in the baseline inventory will give the City leverage when advocating for regional and state-wide programs to reduce transportation related emissions. Including emissions from state highways also ensures that the emissions from pass-through traffic are accounted for and that a local government is actively involved in working with regional transportation planning agencies and the state to reduce this source of emissions.

One argument against including emissions from state highways in Hayward's inventory is that the City does not have direct control over reducing emissions from highway travel. In other words, Hayward does not presently have enough regional influence to reduce travel on state highways sufficiently to meet its emissions target. As a result, the City will have to collaborate with other communities in the region, and success will depend not only on Hayward's participation, but also on the participation of other communities. By including emissions from state highways in its inventory, Hayward is placed in a situation where they are depending on other communities in order to achieve its emissions reduction goals. The state of California has recognized this challenge, and has passed SB 375, which aims to provide a framework for regional collaboration to reduce transportation-related emissions.

ICLEI's standardized inventory methodology allows communities to calculate emissions from local roads and state highways separately. The ability to separate emissions from state and local roads will allow Hayward to track emissions for which it has direct control (emissions from local roads), and emissions for which it does not have direct control (emissions from state roads).

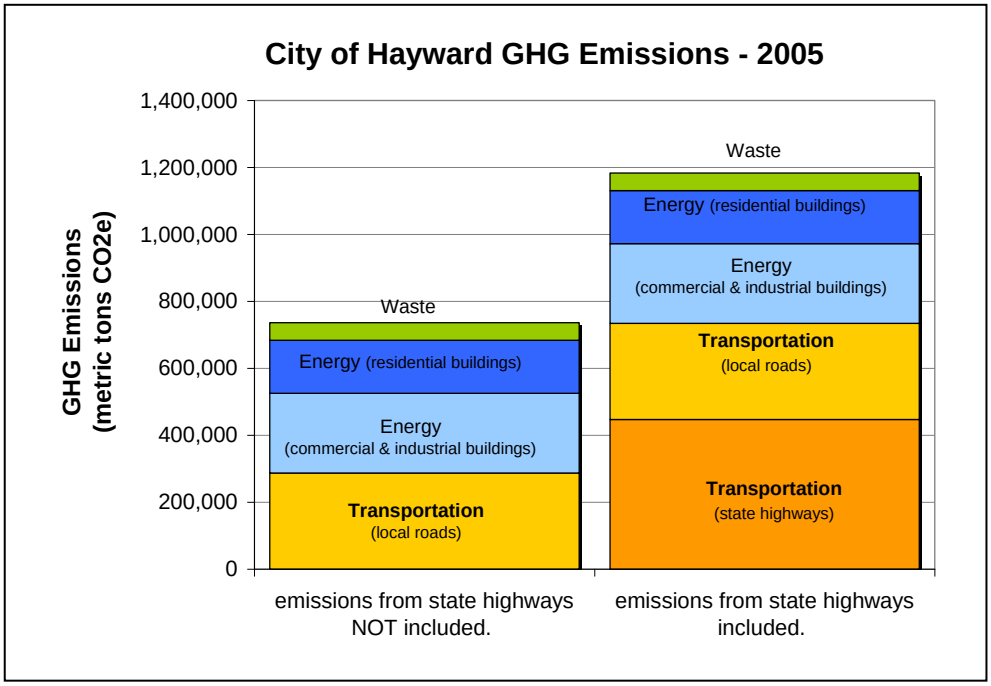


Figure 5: City-wide emissions including and not including emissions from State highways
Source: ICLEI

Energy Emissions

In 2005, Hayward consumed about 922 million kWh of electricity and 36 million therms of natural gas resulting in 396,754 metric tons of CO_2e emissions. Forty percent of the energy-related emissions were attributed to energy consumption in residential buildings and 60 percent were attributed to energy-consumption in commercial/industrial buildings.

Solid Waste Emissions

In 2005, Hayward sent approximately 158,000 metric tons of solid waste to landfills resulting in the release of 52,438 metric tons of CO_2e emissions.

Municipal Emissions

In the base year of 2005, Hayward's municipal operations generated 9,647 metric tons of CO_2e. The City's vehicle fleet accounted for a majority of emissions at 43 percent. Municipal emissions in Hayward constitute 0.8 percent of Hayward's total emissions. Local government emissions typically fall between one and five percent of overall community emissions (see Figure 6).

As a minor contributor to total City-wide emissions, actions to reduce municipal energy use will have a limited impact on Hayward's overall community emissions levels. However, municipal action can help reduce City government's operating costs and has important symbolic value demonstrating leadership that extends far beyond the magnitude of emissions actually reduced.

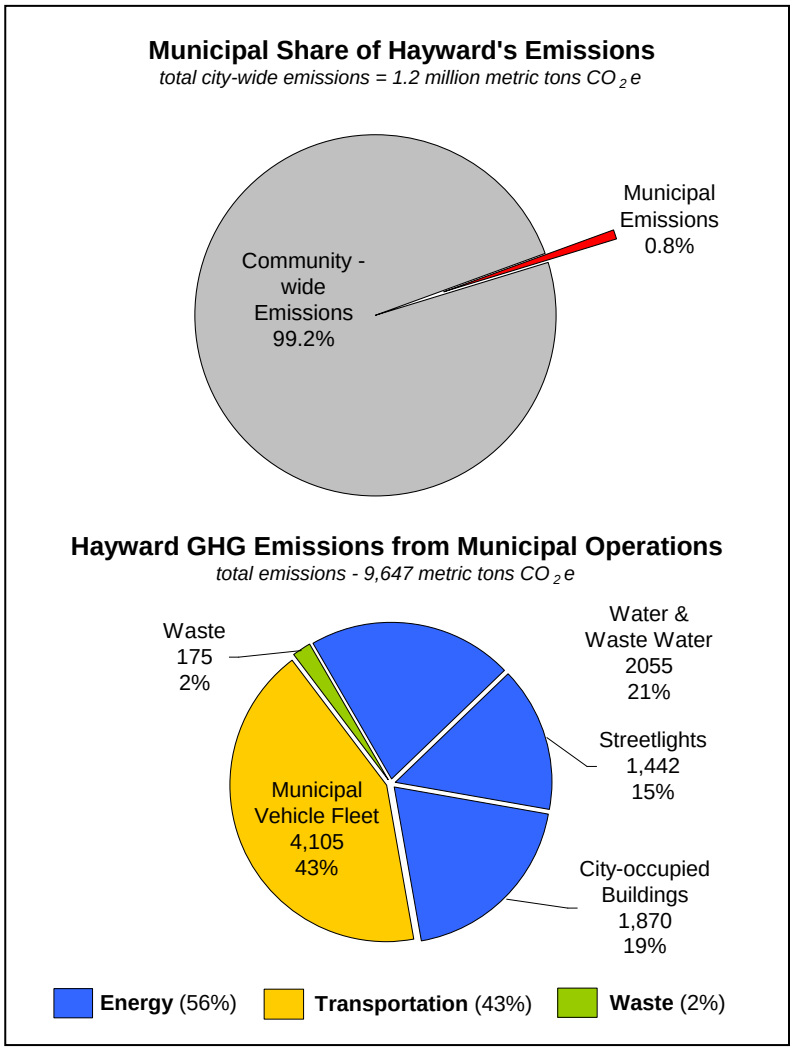

Municipal Share of Hayward's Emissions
total city-wide emissions = 1.2 million metric tons CO2e
Municipal Emissions 0.8%
Community - wide Emissions 99.2%
Hayward GHG Emissions from Municipal Operations
total emissions - 9,647 metric tons CO2e
Waste 175 2%
Water & Waste Water 2055 21%
Streetlights 1,442 15%
Municipal Vehicle Fleet 4,105 43%
City-occupied Buildings 1,870 19%
Energy (56%)
Transportation (43%)
Waste (2%)

Figure 6: Municipal GHG emissions in 2005
Source: ICLEI

Transportation Emissions

The City's vehicle fleet emitted 4,105 metric tons of CO_2e. The municipal fleet includes all vehicles owned and operated by the City of Hayward plus some contractor vehicles performing City functions.

Energy Emissions

In 2005, Hayward used about 19.8 GWh of electricity and 181,000 therms of natural gas to operate City-owned streetlights, to pump and treat water and waste water, and to heat and light municipal buildings. This resulted in 5,367 metric tons of CO_2e emissions. Energy-related emissions accounted for 56 percent of Hayward's municipal emissions in 2005.

Solid Waste Emissions

The City of Hayward government operations reported sending 680 tons of solid waste to the landfill resulting in 175 tons of CO_2e. The City does have recycling programs in place to reduce tonnage disposed, but these emissions reductions were not accounted for in this inventory.

Projected GHG Emissions Forecast

The emission forecast is an estimate of future emissions assuming that no effort has been made to reduce emissions. The emission forecast represents a business-as-usual (BAU) prediction of how GHG emissions may change in the City of Hayward over time if no emissions reductions programs are implemented. The forecast projects the growth in GHG emissions that will occur in a given future year. The emissions growth is based on estimated population growth and on changes in the employment mix. The City has used the BAU emissions forecast to estimate the required emissions reductions to meet emissions targets.

Two emissions forecast scenarios are presented. The Scenario 1 forecast uses ICLEI's methodology which assumes that the number of drivers, electricity and natural gas use, and quantity of solid waste generated will increase over time in proportion to population, number and type of jobs, and housing availability. Hayward's community-specific annual growth rates for the transportation, residential energy, commercial energy, and solid waste sectors are presented in Table 1. ICLEI's methodology assumes that fuel economy and the percent of electricity generated from renewable sources remains constant throughout the forecast period. At the time ICLEI developed their business-as-usual estimate, it was reasonable to assume that both vehicle fuel economy and the percentage of renewable generation in PG&E's electric generation mix would remain constant, but recent legislative activity has made this assumption less plausible.

Table 1: Assumed annual growth rates for emissions projections

Emissions Source	Annual Growth Rate
Transportation (fuel consumption)	1.51 percent
Energy - residential sector (electricity and natural gas use)	0.61 percent
Energy - commercial & industrial sectors (electricity and natural gas use)	1.25 percent
Waste (tons of solid waste sent to landfill)	0.61 percent

Source: ICLEI

The Energy Independence, Clean Air, and Climate Security Act of 2007, which was passed in June 2007, increased corporate average fuel economy standards (CAFE standards) for automobiles and light trucks for the first time since the standard was first enacted in 1975. Starting in model year 2019, the combined average fuel economy of all vehicles sold by each auto-maker must be at least 35 miles per gallon. By 2030, the corporate average fuel economy must be at least 45 miles per gallon. Based on the existing CAFE standards, it is realistic to assume that fuel economy will increase until at least 2030.[27]

There will be even more reason to assume that fuel economy will increase if the EPA grants CARB a waiver to regulate tailpipe emissions from automobiles. As discussed in Section 1, CARB applied for a waver to enforce tailpipe emission standards that were put into place after the Pavely Bill was signed. In 2007, the US EPA rejected CARB's request for a waiver, but with the incoming Obama administration it is likely that the US EPA will reconsider the waiver request. If the EPA grants the waiver, CARB will have the authority to enforce regulations that call for carbon dioxide and other pollutants to be reduced by 22 percent by the 2012 model year and 30 percent by the 2016 model year, which would result in higher average fuel economy than is mandated through CAFE standards.

[27] National Highway Traffic Safety Administration. *Laws/Regulations/Guidance Corporate Average Fuel Economy.* http://www.nhtsa.dot.gov/portal/site/nhtsa/menuitem.43ac99acfa80569cea57529cdba046a0/

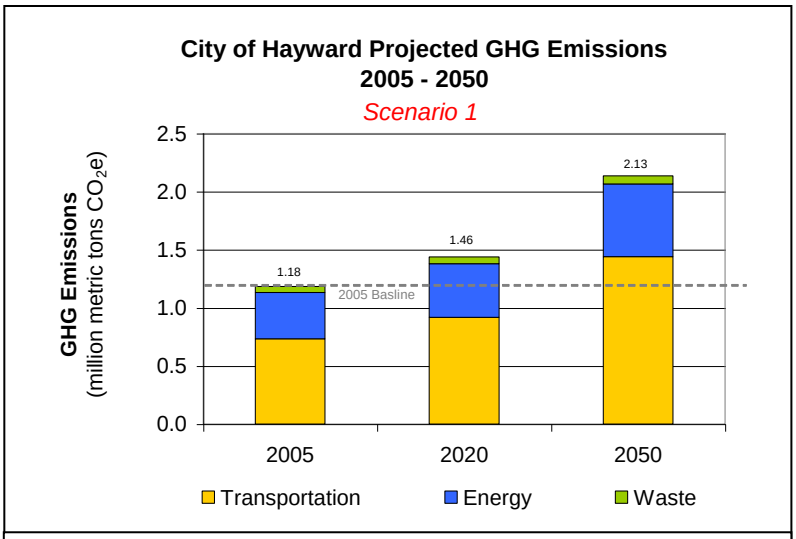
Existing legislation also justifies the assumption that the amount of electricity generated from renewable sources will increase over time. Senate Bill 1078 established a renewable portfolio standard (RPS) requiring California's three major utilities – Pacific Gas & Electric, Southern California Edison, and San Diego Gas & Electric to produce a minimum amount of electricity using renewable source. At the time the CAP was released, RPS requirements were 33 percent renewable electricity by 2020.[28] Current legislation has not set a long-term RPS goal for 2050, but based on California's recent trend of increasing the RPS goals on a regular basis, it is reasonable to assume that in 2050 the RPS goal will be at minimum 45 percent renewable generation.

The Scenario 2 forecast takes recent legislation into consideration and assumes that both vehicle fuel economy and utility renewable electricity generation will increase over time. Scenario 2 maintains the Scenario 1 assumptions about increased number of drivers, electricity and natural gas use, and solid waste generation.

Figures 7 and 8 show Hayward's BAU emissions projections based on Scenario 1 and Scenario 2 assumptions. There is a significant difference between these two emissions forecasts. Scenario 1 predicts that emissions will increase by 200,000 metric tons CO_2e between 2005 and 2020, whereas Scenario 2 predicts emissions will only increase by roughly 30,000 tons in that time. The difference in Scenario 1 and Scenario 2 emissions forecasts illustrates that state and federal legislation is expected to have a measurable impact on local emissions. It also exemplifies the importance of advocating for even more aggressive state and federal policies.

Because Scenario 2 is more plausible given the recent changes to state and federal policy, the Scenario 2 BAU forecast is used as a basis for all analyses in the CAP.

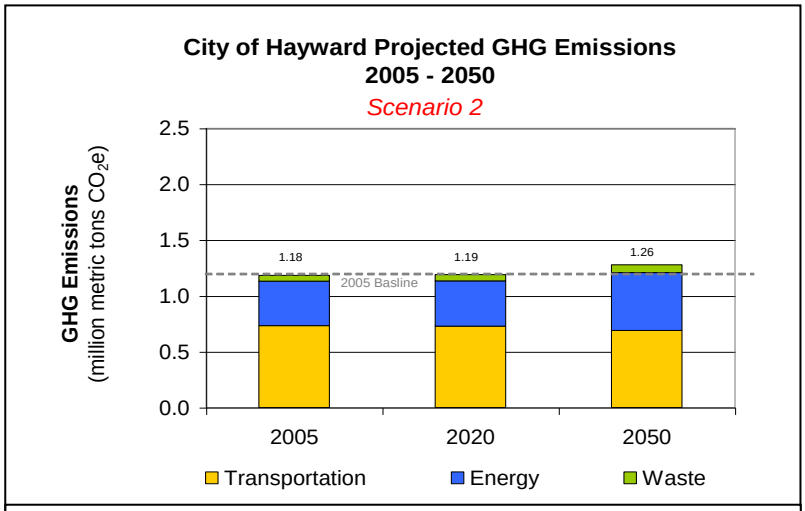
[28] CPUC. Renewable Portfolio Standards. *California Renewable Portfolio Standards (RPS).* http://www.cpuc.ca.gov/PUC/energy/electric/renewableenergy/index.htm



Scenario 1

- ICLEI growth rates
- Fleet average fuel economy remains constant at 19.1 MPG for gasoline vehicles and 6.2 MPG for diesel vehicles
- Percent renewable electricity generation remains constant at 12 percent

Figure 7: Scenario 1 projected City-wide GHG emissions 2005, 2020, and 2050.
Source: ICLEI, City Analysis



Scenario 2

- ICLEI growth rates
- Fleet average fuel economy increases:
- gasoline vehicles: 25 MPG by 2020, 45 MPG by 2050
- diesel vehicles: 6.8 MPG by 2020, 9 MPG by 2050
- Percent renewable electricity generation increases:
  - 33 percent renewable generation by 2020
  - 40 percent renewable generation by 2050

Figure 8: Scenario 2 projected City-wide GHG emissions 2005, 2020, and 2050.
Source: ICLEI, City Analysis

Hayward Emissions in a Global Context

It is estimated that Hayward accounted for approximately 0.2 percent of California's total GHG emissions in 2005 and less than 0.004 percent of the total global emissions. Figure 9 shows global GHG emissions, which include emissions from the highest emitting countries, the State of California, Alameda County, and in the City of Hayward. For comparison purposes, if considered a country of its own, California would be the 16th largest emitter in the world. California has the second highest emissions in the United States, yet California has one of the lowest per capita emissions rates in the United States.

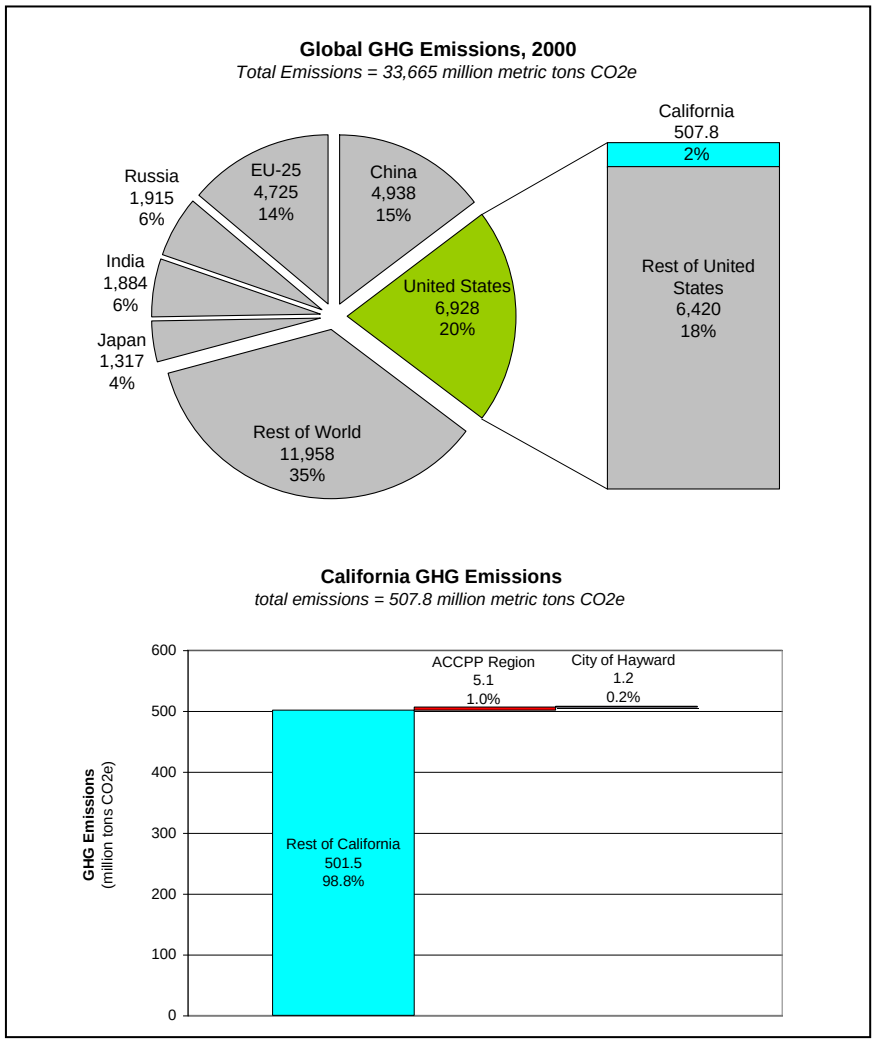


Figure 9: City-wide GHG emissions related to global emissions

Sources: 1) Kevin A. Baumert, Timothy Herzog, and Jonathan Pershing. Navigating the Numbers: Greenhouse Gas Data and International Climate Policy. World Resource Institute. 2005. 2) California Air Resource Board. Greenhouse Gas Inventory Data—1990 to 2004 inventory by IPCC category. Last reviewed July 29, 2008. Retrieved on September 16, 2008 from www.arb.ca.gov/cc/inventory/data/data.htm. 3) Stopwaste.org. Climate Action Plan Template 2007. Table 1. (2005 data) 4) ICLEI. City of Hayward GHG Inventory Report. (2005 data).

Note: All data is for reporting year 2000, except ACCPP and City of Hayward data is for reporting year 2005.)

Section 3 – Emissions Reduction Target

Section 3 begins with a discussion of the reasons for setting emissions reduction targets. The Section then describes how Hayward set the proposed emissions reduction target. Hayward's emissions targets are then presented. The Section concludes with a brief description of other jurisdiction's emissions targets.

Purpose of Emissions Reduction Target

Clearly defined emissions reduction targets will provide City decision makers and the community with a clear direction for Hayward's emissions management efforts, and will provide milestones against which progress can be evaluated over time. The qualitative goal is to greatly reduce the amount of global warming gases being emitted into the atmosphere in order to diminish the anthropogenic causes of climate change. This qualitative target is difficult to measure, and even more difficult to verify. Targets are more useful if they are both measurable and verifiable.

Long-term targets provide direction for the shorter-term interim goals and their associated implementation programs. An example of a long-term goal is California's goal of reducing State-wide GHG emissions to 80% below 1990 level by 2050. This is a good example of a clearly defined emissions reduction goal: it defines the target area (all emissions occurring with the State of California), provides a quantified expected result (80% below the 1990 level), and provides a stated time period in which the goal is to be achieved (by the year 2050).

The more clearly targets are defined; the easier it will be to develop focused programs to achieve the target and to measure and evaluate progress toward meeting the target. In the end, targets are only useful if the community is committed to meeting the targets. Without effective implementation programs, goals can easily become little more than wish lists.

How a Target was Established

Using AB 32 as Guideline

Many factors were considered when selecting Hayward's reduction target. The City strived to choose a target that is both aggressive and achievable given local circumstances. Hayward based its GHG reductions goals on the goals established in the State's AB 32: Global Warming Solutions Act.[29] Hayward adopted the State's emissions reductions goals for the following reasons:

- AB 32 goals are backed by detailed analyses which considers, among other things, costs and benefits, technical feasibility, and impact on the economy and environment.
- AB 32 sets aggressive reduction goals, which aligns with Hayward's commitment to combat climate change.
-
- By adopting the State's emissions reduction goals, Hayward can help make AB 32 a stronger initiative. AB 32 has already gained the support from several cities, and as more cities adopt its

[29] AB 32 set the state-wide goal of reducing GHG emissions to: (1) 2000 levels by 2010; (2) to 1990 levels by 2020, which is equivalent to 12 percent below 2005 levels by 2020; and (3) to 80 percent below 1990 levels by 2050, which is equivalent to 83 percent below 2005 levels by 2050.

goals it becomes easier for other cities to join the initiative. By showing support for AB 32, Hayward is sending a strong message to other cities that the initiative is legitimate and worth supporting.

It should also be noted that for the purposes of setting reduction targets, the City included emissions from both local roads and State highways. The concern with including emissions from State highways in the reduction target is that Hayward is not in immediate control of these emissions. A significant portion of these emissions are generated from vehicles that pass through Hayward, and that are not generated by local residents or local business activities. However, including emissions from State highways is important in that it gives Hayward's representatives leverage in their efforts to advocate for state, regional and federal policies and programs that aim to reduce emissions from vehicles. In addition, if emissions from State highways were not included in Hayward's reduction targets there would be some question as to how these emissions would be monitored. By including emissions from State highways, Hayward has become one of the responsible parties committed to reducing these emissions.

Calculation method

As discussed in the previous section, Hayward opted to adopt State-wide emissions reductions goals. State-wide emission targets are based on a 1990 baseline, but Hayward's inventory uses a 2005 baseline. To address the difference in the State and City baseline years, the City calculated what the State goals would be if they were calculated from a 2005 baseline and found that the targets are equivalent to reducing emissions to 12.5 percent below the 2005 level by 2020 and 83 percent below the 2005 level by 2050 (as compared to matching 1990 levels by 2020 and 80 percent below 1990 levels by 2050). Phrasing the target based on 2005 emissions levels does not change the targeted quantity of emissions; specifically, California's goal is for emissions to be no more than 85.3 million metric tons CO_2e in 2050. This is equivalent to 80 percent below the 1990 emissions (427 million metric tons CO_2e) or 82.5 percent below the 2005 emissions (480 million metric tons CO_2e).

Determining necessary emissions reductions to meet target

The emissions reductions necessary to meet the target is the difference between the business-as-usual emissions level and the target emissions level. As shown in Figure 10, if emissions reductions are measured from the 2005 baseline, the savings will not be large enough to meet the 2050 target. This is because emissions are expected to increase over time, so the City will have to make up for the projected emissions growth.

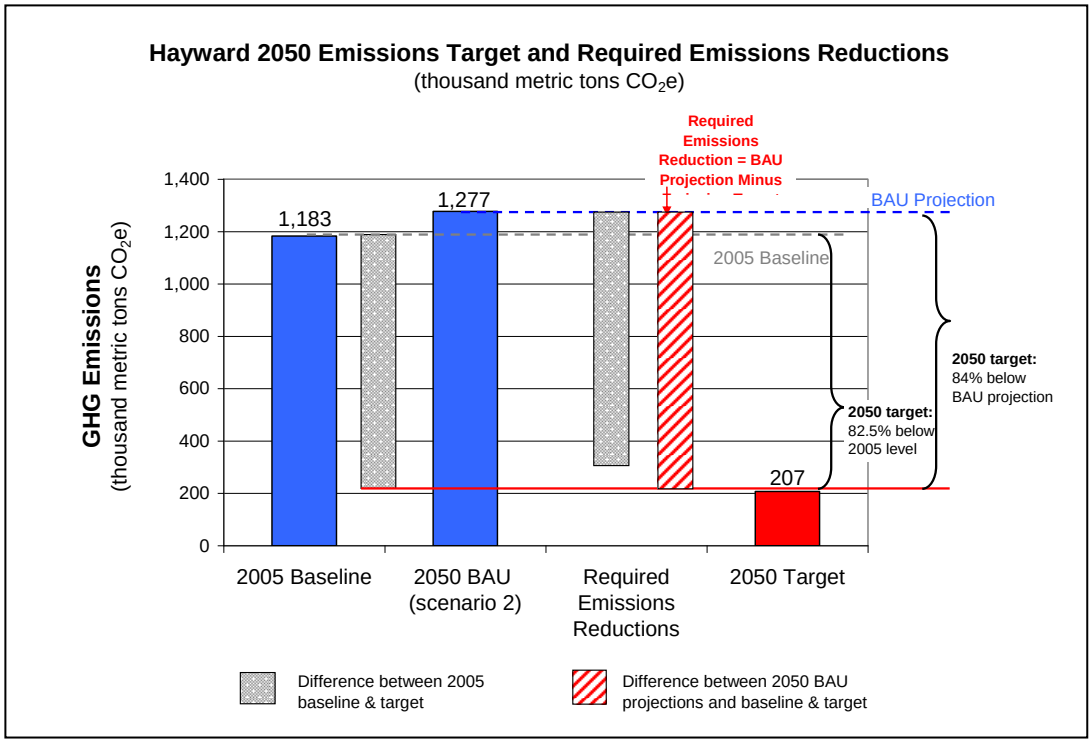


Figure 10: Necessary Emissions Reductions
Source: 1) ICLEI. 2) HDR analysis

Hayward's Emission Reduction Targets

Community-wide emissions target

Hayward's emissions reduction target represents a percentage by which the community aims to decrease emissions below the 2005 baseline, by the target years of 2020 and 2050. The City aims to reduce emissions by the following amounts:

- 6 percent below 2005 levels by 2013
- 12.5 percent below 2005 levels by 2020
- 82.5 percent below 2005 levels by 2050

The difference between Hayward's 2020 projected emissions and its 2020 emissions goal is about 154,642 metric tons CO_2e. This means that if Hayward meets the 2020 target, the City will have prevented 154,642 metric tons CO_2e from being emitted into the atmosphere. This is equivalent to:

- The CO_2 emissions from 28,323 cars driving for one year.
- The CO_2 emissions from electricity use of 20,482 homes for one year.
- The CO_2 emissions from burning 808 railcars worth of coal.
- The carbon sequestered annually from 35,146 acres of pine or fir forest.[30]

[30] Equivalencies calculated with EPA's Greenhouse Gas Equivalencies Calculator (www.epa.gov/cleanenergy/energy-resources/calculator.html).

The interim GHG reductions target in 2013 was established to enable Hayward to set a short-term goal for the first five years of the program. This short-term goal will enable Hayward to benchmark their progress towards meeting the more aggressive longer-term goals (see Figure 11).

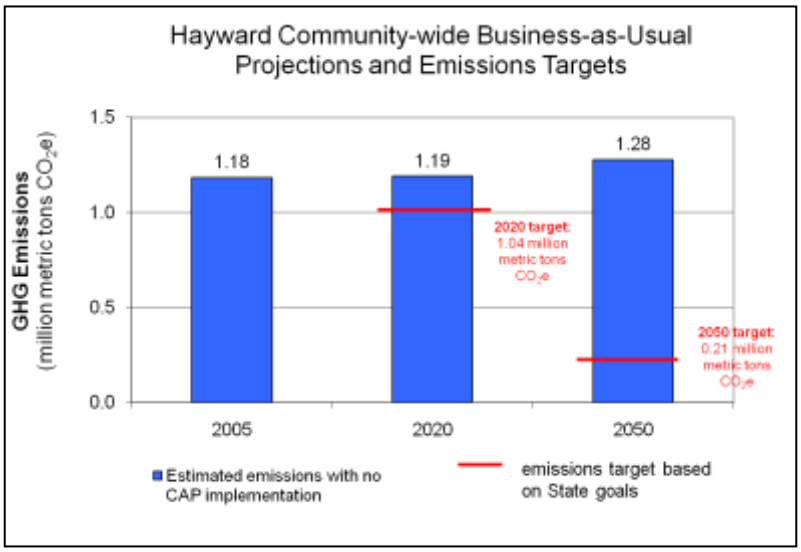


Figure 11: Hayward's community-wide emissions projections and targets
Source: 1) ICLEI. 2) HDR analysis

* Business-as-usual emissions based on Scenario 2 projections which assumes ICLEI growth rates for transportation, energy, and waste sectors; fleet average fuel economy for gasoline vehicles increases to 25 MPG by 2020, 45 MPG by 2050; fleet average fuel economy for diesel vehicles increases to 6.8 MPG by 2020, 9 MPG by 2050; percent renewable electricity generation increases to 33 percent by 2020 and 40 percent by 2050.

Municipal operations emissions reduction target

It is recommended that the City lead by example to reduce emissions from municipal operations. The CAP recommends that the City adopt the same target for municipal emissions as it adopts for community-wide emissions reductions. Figure 12 shows business-as-usual emissions from Hayward's municipal operations and the emissions reduction targets.

The proposed target (6 percent below 2005 level by 2013, 12.5 percent below 2005 level by 2020, and 82.5 percent below 2005 level by 2050) is slightly less aggressive than the targets CARB encourages local governments to adopt. In the AB 32 Scoping Plan, CARB encouraged local governments to adopt a goal of reducing emissions to 15 percent below current levels by 2020. Hayward interprets this as 15 percent below 2008 levels (the last full calendar year) by 2020. It is estimated that if Hayward's goal were based on a 2008 baseline, the 2020 goal would be to reduce emissions by about 12.5 percent (same percent reduction below 2005 level because emissions probably did not change significantly between 2005 and 2008), not the recommended 15 percent reduction that CARB recommends.

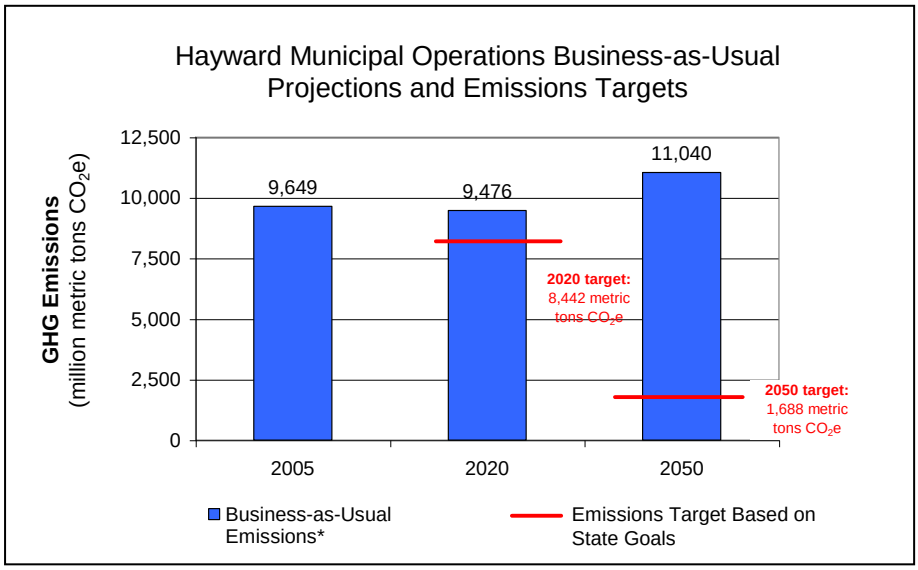


Figure 12: Hayward's municipal operations emissions projections and targets
Source: 1) ICLEI. 2) HDR analysis

* Business-as-usual emissions based on Scenario 2 projections which assumes ICLEI growth rates for transportation, energy, and waste sectors; fleet average fuel economy for gasoline vehicles increases to 25 MPG by 2020, 45 MPG by 2050; fleet average fuel economy for diesel vehicles increases to 6.8 MPG by 2020, 9 MPG by 2050; percent renewable electricity generation increases to 33 percent by 2020 and 40 percent by 2050.

Other Entities' GHG Reduction Targets

Aligning Hayward's target with regional and state targets

Hayward is committed to setting emissions reduction targets that are in line with the targets of regional planning organizations such as the Joint Policies Committee, which includes MTC, ABAG, BCDC, and BAAQD. For example, if Hayward implements the proposed actions according to the recommended timeline, the City will achieve a 65 percent reduction in transportation-related emissions by 2035. This reduction is larger than MTC's goal of 40 percent reduction in transportation-related emissions by 2035.[31] Had the Plan not achieved MTC's goal, Hayward would have increased program goals to keep the City's goals in line with the regional planning committee goals[32], [33]

Examples of targets from other jurisdictions

Table 2 lists some climate goals set by other jurisdictions across California and the world. Hayward's goal is comparable with the targets of other cities and regions. Note that Hayward's goal is based off of 2005 emissions levels whereas other Cities have based their goals off of emissions from 1990 or 2000. For this reason it is difficult at first glance to see how the various emission targets relate to one another.

[31] The Joint Policy Committee set a goal to reduce transportation-related emissions. The CAP sets goals to reduce vehicle miles traveled (VMT) and fuel economy. If the City meets its VMT and fuel economy goal, it will realize emissions savings.
[32] Joint Policy Committee. *Policies for the Bay Area's Implementation of Senate Bill 375*. January 23, 2009. http://www.abag.ca.gov/jointpolicy/Policies%20for%20SB%20375.pdf
[33] MTC. *Transportation 2035: Change in Motion*. April 2009. www.mtc.gov/planning/2035_plan/.

Table 2: Examples of other jurisdictions' goals

Jurisdiction	GHG reduction target
California Cities	
Berkeley	33% below 2000 level by 2020 and 80% below 2000 level by 2050
Chula Vista	35% below 1990 level by 2035
Hayward	12% below 2005 level by 2020, 83% below 2005 level by 2050
Los Angeles	35% below 1990 level by 2030
Palo Alto	5% below 2005 level by 2012 and 15% below 2005 levels by 2020
Riverside	12% below 1990 level by 2012
Sacramento	1990 level by 2020, 25% below 1990 level by 2030, 80% below 1990 levels by 2050
San Jose	35% below 1990 level by 2020
San Diego	15% below 1990 level by 2010
Bay-Area Counties	
Alameda County	80% below 2007 level by 2050
Marin County	15% below 2000 level by 2020
San Francisco	20% below 1990 level by 2012
Sonoma County [a]	25% below 1990 levels by 2015
State, National, International	
Denmark	21% below 1990 level by 2012
European Union	20% below 1990 level by 2020
Germany	21% below 1990 level by 2012
Luxembourg	28% below 1990 level by 2010
Sweden	30% below 1990 level by 2020
United Kingdom	20% below 1990 level by 2010
state of California: AB 32	2000 level by 2012, 1990 level by 2020, and 80% below 1990 level by 2050
Kyoto Protocol	1990 level by 2012
U.S. Mayors' Climate Protection Agreement	1990 levels by 2012 (or better)

(a) All nine cities in Sonoma County have adopted target at least as aggressive

Section 4 – Approach to Emissions Reductions

Section 4 describes the approach taken in developing the emissions reduction plan. The section begins with a discussion of the purpose of the emissions reductions strategies and the approach taken in developing them. The section then provides an introduction to each of the major emissions generating sectors – transportation, energy use by buildings and other facilities, and by the management of solid waste. The strategies and actions proposed for each of these sectors are then described in more detail in Section 5 of the report.

Achieving Target through Cumulative Emissions Savings

Figure 13 indicates that if Hayward designs the recommended CAP programs so they achieve the programs goals, as presented in Appendix C, and implements the CAP programs according to the suggested timetable, as presented in Appendix E, the estimated annual emissions savings will be approximately 189,000 metric tons CO_2e and 1,084,000 metric tons CO_2e in 2020 and 2050, respectively. The top chart shows these emissions savings subtracted from the Scenario 1 business-as-usual (BAU) case where the average fuel economy remains at 19.1 MPG indefinitely and the amount of renewable energy generation will remain constant at about 12% renewable generation. The bottom chart shows emissions savings subtracted from the Scenario 2 BAU case where fuel economy and percent renewable generation increase over time. See Section 3 for an explanation of Scenario 1 and Scenario 2 BAU cases.

Although Hayward's emissions target is to reduce emissions to 12.5 percent below the 2005 level by 2020, the City will have to reduce emissions by more than just 12.5 percent. If Hayward does nothing, or continues on the BAU path, GHG emissions will continue to increase in proportion to population, number of jobs, and housing availability. To meet targets, Hayward will have to prevent the expected emissions growth, reduce emissions back to 2005 levels, and then eliminate another 12.5 percent of emissions. For this reason, emissions reductions are subtracted from the BAU projections, not the 2005 baseline. Appendix B includes a table with each action and the estimated emissions reductions expected for the years 2020 and 2050.

Figures 14, 15, and 16 show Hayward's projected BAU emissions (using Scenario 2 projections) with and without implementing the strategies and actions presented in the CAP. Figure 14 shows how each strategy proposed in the CAP will contribute to meeting the overall emission target, but no single action will enable Hayward to meet its long-term emissions reduction target. To meet the target, Hayward will have to implement a wide range of actions in each of the major emissions producing sectors – transportation, energy use in buildings, and waste management.

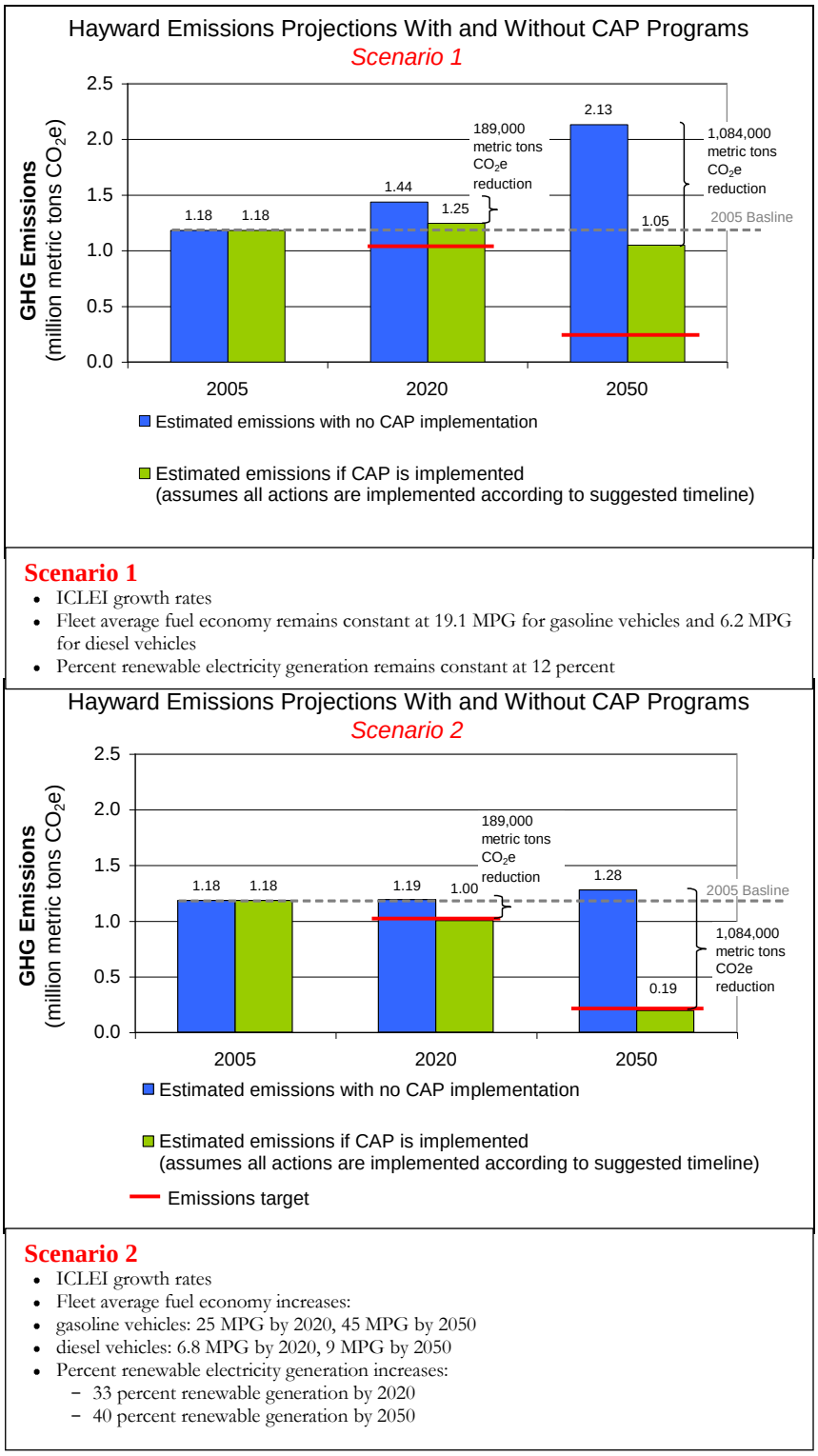
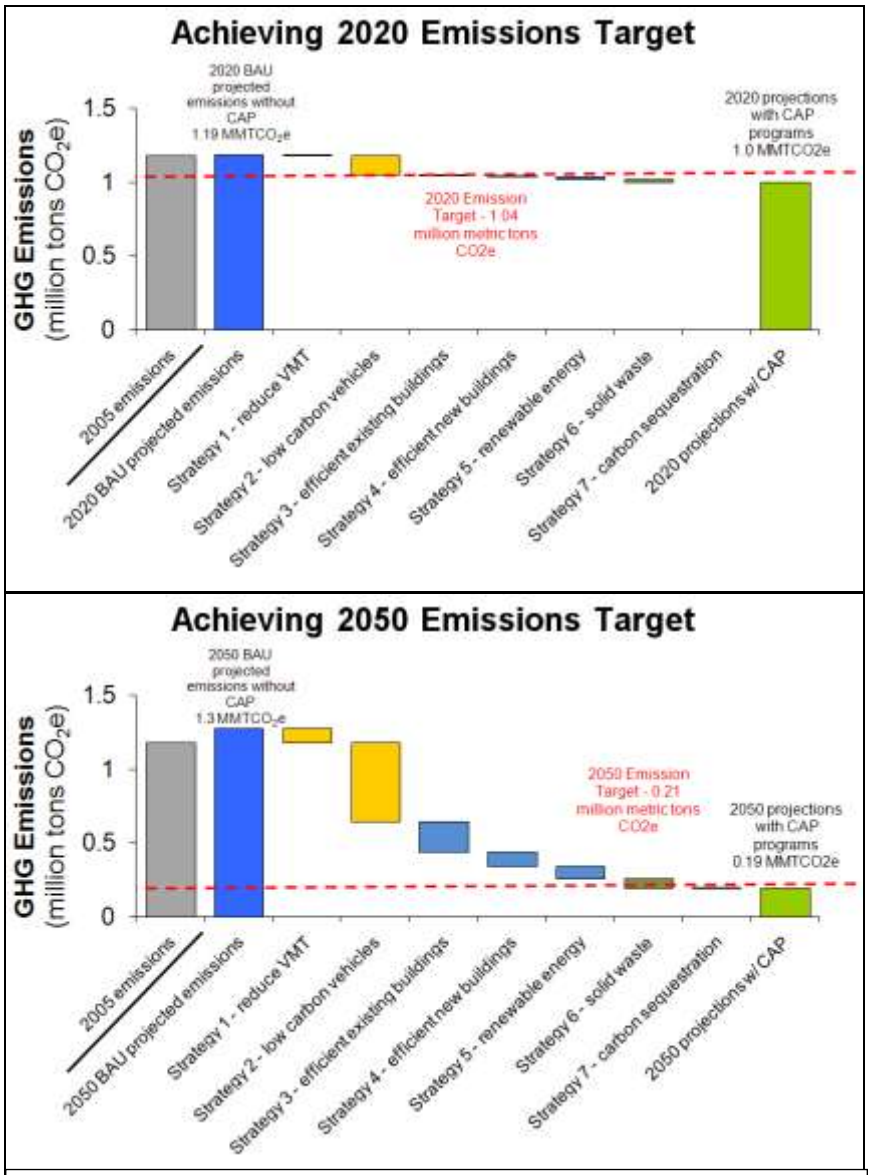


Figure 13: Projected emissions with and without CAP programs, 2020 and 2050
Sources: 1) ICLEI, 2) City analysis


Achieving 2020 Emissions Target
GHG Emissions (million tons CO_2e)
1.5
1
0.5
0
2020 BAU projected emissions without CAP 1.19 $MMTCO_2e$
2020 projections with CAP programs 1.0 MMTCO2e
2020 Emission Target - 1.04 million metric tons CO2e
2005 emissions
2020 BAU projected emissions
Strategy 1 - reduce VMT
Strategy 2 - low carbon vehicles
Strategy 3 - efficient existing buildings
Strategy 4 - efficient new buildings
Strategy 5 - renewable energy
Strategy 6 - solid waste
Strategy 7 - carbon sequestration
2020 projections w/ CAP
Achieving 2050 Emissions Target
GHG Emissions (million tons CO_2e)
1.5
1
0.5
0
2050 BAU projected emissions without CAP 1.3 $MMTCO_2e$
2050 Emission Target - 0.21 million metric tons CO2e
2050 projections with CAP programs 0.19 MMTCO2e
2005 emissions
2050 BAU projected emissions
Strategy 1 - reduce VMT
Strategy 2 - low carbon vehicles
Strategy 3 - efficient existing buildings
Strategy 4 - efficient new buildings
Strategy 5 - renewable energy
Strategy 6 - solid waste
Strategy 7 - carbon sequestration
2050 projections w/ CAP

Scenario 2

- ICLEI growth rates
- Fleet average fuel economy increases:
  - gasoline vehicles: 25 MPG by 2020, 45 MPG by 2050
- diesel vehicles: 6.8 MPG by 2020, 9 MPG by 2050
- Percent renewable electricity generation increases:
  - 33 percent renewable generation by 2020
  - 40 percent renewable generation by 2050

Figure 14: CAP Strategy contribution to achieving 2020 and 2050 targets
Sources: 1) ICLEI, 2) City analysis

Meeting the 2020 target

Given the estimated quantity of emissions reductions possible if Hayward achieves all program goals and implements programs according to the suggested timeline, as outlined in Appendix C, the City will likely meet its 2020 target. However, to achieve the program goals, Hayward will have to be diligent. Actively contributing to regional and state-wide initiatives will help Hayward leverage other jurisdiction's efforts and allow the City build on regional efforts to develop strategies that will be useful in other communities as well.

Meeting the 2050 target

To achieve the 2050 target, Hayward will have to meet aggressive long-term goals including:

- Reduce VMT of passenger vehicles to 30 percent below the projected business-as-usual level
- Reduce VMT of diesel vehicles (heavy trucks) by 10 percent below projected business-as-usual level
- Increase average fuel economy of passenger vehicles to 75 mpg [34]
- Increase average fuel economy of diesel vehicles to 11.5 mpg
- Supply 100 percent of electricity from renewable sources
- Reduce electricity consumption to 65 percent below business-as-usual projections
- Reduce natural gas consumption to 50 percent below business-as-usual projections
- Eliminate emissions from methane produced from waste decomposition

These goals are a serious challenge but are not out of reach. The technology required to meet these goals is available today. Electric vehicles are rolling off of assembly lines, and renewable power is becoming more common. Appliances like TVs, refrigerators, fans, toasters, stereos, hair dryers, and drills are becoming increasingly more energy efficient. Developing technology is not the biggest challenge to achieving the 2050 goal. The biggest challenge is creating the conditions for the existing technologies to sufficiently penetrate the market and the culture. Hayward faces the challenge of using its resources to help direct its residents and businesses to embrace new technologies and new ways of thinking about our collective impact on the climate. Hayward can help achieve the 2050 goals by actively participating in local, regional, state, and federal initiatives that aim to reduce emissions from the transportation, energy, and water sectors.

The transportation-related goals listed above are stated in terms of reducing VMT in conventional gasoline- and diesel-powered vehicles and increasing the fuel economy of gasoline-powered passenger vehicles and diesel-powered heavy trucks. The CAP did not attempt to evaluate the climate impacts of switching to lower-carbon fuels or transitioning to electric or hybrid vehicles. However, equivalent emissions reductions can be achieved using a number of different vehicle technologies. In the coming decades, it is very likely that there will be more variety in the types of vehicles on the road. It is difficult to predict which vehicles will be most popular, but it is certain that vehicle manufacturers will explore offering electric, hybrid, plug-in hybrid, compressed natural gas vehicles, diesel and biodiesel vehicles, and (if there is a breakthrough in fuel-cell technology) hydrogen vehicles. Though the CAP did not attempt to quantify the emissions impacts of these alternative vehicles, the City should work to promote a transportation plan that will result in emissions savings, regardless of technologies deployed.

[34] If Hayward achieves its long-term VMT reduction goal and its long-term fuel economy goal, the City will reduce overall gasoline use by over 78 percent below business-as-usual projections.

Hayward should re-evaluate the CAP regularly to incorporate new technologies and new ideas that are not included in this iteration of the plan. In the future there may be more effective ways to sequester carbon, or better energy efficiency or renewable energy technologies that Hayward would benefit from adopting. Technology improvements to look out for include advances in battery technology (which could be applicable to both renewable energy and electric vehicles), higher efficiency and lower cost solar panels, advances in wind turbines to reduce noise, fuel-cell technologies, waste management strategies that convert waste streams to renewable and non-renewable energy, and advances in energy-efficient appliances, lighting, heating, and cooling. It is recommended that Hayward update its CAP at least once every 10 years to ensure that the City is taking advantage of the most up-to-date technologies and the most effective methods for reducing community-wide emissions. When updating the CAP, Hayward should aim to identify specific technologies and operational practices that will enable the City to meet its long-term 2050 reduction target.

Cooperation with State and federal agencies

The largest percentages of Hayward's GHG emissions are from vehicle use and from electricity and natural gas consumption. To be successful in meeting its emissions reduction goals, substantial reductions will be necessary from all of these sources. When looking at the estimated emissions reductions from various proposed actions, it becomes clear that a few critical actions can have a large impact on the reduction effort. For example, in the transportation sector, actions 2.1 and 2.2 - increasing the fuel economy of vehicles; and in the energy sector, action 5.4 - increasing the percentage of renewable energy used to generate electricity, are expected to contribute substantially more emissions reductions than other actions identified in the CAP.

These actions (actions 2.1, 2.2, and 5.4) are also the actions that the City has the least direct control over. Hayward does not have the authority to mandate fuel economy of vehicles sold in its jurisdiction, nor does it have the authority to increase the amount of electricity a utility produces from renewable sources. Hayward can, however, influence these federal and state-level decisions by acting in cooperation with other communities.[35] As vital components of Hayward's emissions reduction plan, it is critical that Hayward do what it can to support the federal and state efforts to increase fuel economy and to increase the amount of electricity generated from renewable sources.

Perhaps the most important state or federal policy Hayward should actively advocate for is placing a price on carbon emissions. At the time of this writing, the country is beginning a debate on what federal-level carbon legislation will be most effective at reducing emissions. The discussion tends to focus on whether a cap-and-trade system or a carbon tax will be a more effective policy.[36],[37] Regardless of what policy makes it through the house and senate (cap-and-trade, carbon tax, or something different), it is critical that carbon is assigned a monetary value. Further, the value of carbon needs to be set high enough so citizens and businesses make a concerted effort to reduce emissions. When the true value of carbon is realized, energy efficiency, renewable energy, alternative vehicles and alternative fuels, and advanced waste management projects will be cost competitive without state and federal incentive

[35] As discussed on pages 80-87 of the CAP, Hayward does have options for increasing the renewable portion of electricity used in the City that would not depend on state or federal action. Hayward does have the option of participating in a Community Choice Aggregation program and thereby purchase electricity from a utility that produces more electricity from renewable sources (see www.communitychoice.info or www.lgc.org/cca for information on Community Choice Aggregation) but Hayward does not have the authority to mandate the percent of electricity that utilities produce from renewable sources.

[36] Yale Environmental 360. *Putting a Price on Carbon: An Emissions Cap or A Tax?* May 7, 2009. http://e360.yale.edu/content/feature.msp?id=2148

[37] Thomas Friedman. *Show us the Ball.* New York Times Opposition and Editorial. April 8, 2009. Page A25 of New York edition. http://www.nytimes.com/2009/04/08/opinion/08friedman.html?_r=2

programs. It is recommended that the City of Hayward advocate for carbon policies that aim to help citizens and businesses realize the true value of carbon.

If the strategies and actions presented in the plan are fully implemented in accordance to the proposed timeline, it is expected that Hayward will meet its 2020 emissions reduction target. If this target is achieved, Hayward will prevent 154,600 metric tons of CO_2e from being released into the atmosphere during the calendar year of 2020. However, these actions alone will not enable Hayward to meet its 2050 target. If Hayward implements all the actions identified in this CAP according to the recommended timeline and achieves all recommended program goals, it is estimated that Hayward's 2050 emissions will be about 948,000 metric tons CO2e. The 2050 target is 207,000 metric tons CO_2e. This means that to meet the 2050 target, Hayward will have to identify a means of reducing emissions by another 741,000 metric tons CO_2e.

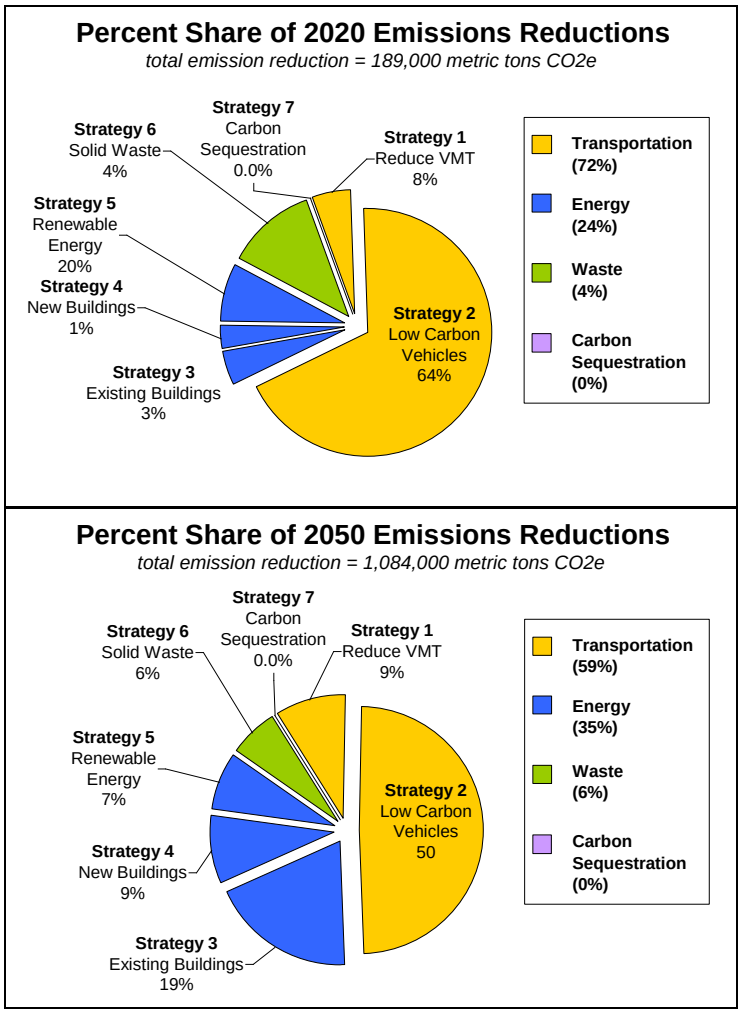

Percent Share of 2020 Emissions Reductions
total emission reduction = 189,000 metric tons CO2e
Strategy 7 Carbon Sequestration 0.0%
Strategy 6 Solid Waste 4%
Strategy 1 Reduce VMT 8%
Strategy 5 Renewable Energy 20%
Strategy 4 New Buildings 1%
Strategy 2 Low Carbon Vehicles 64%
Strategy 3 Existing Buildings 3%
Transportation (72%)
Energy (24%)
Waste (4%)
Carbon Sequestration (0%)
Percent Share of 2050 Emissions Reductions
total emission reduction = 1,084,000 metric tons CO2e
Strategy 7 Carbon Sequestration 0.0%
Strategy 6 Solid Waste 6%
Strategy 1 Reduce VMT 9%
Strategy 5 Renewable Energy 7%
Strategy 2 Low Carbon Vehicles 50
Strategy 4 New Buildings 9%
Strategy 3 Existing Buildings 19%
Transportation (59%)
Energy (35%)
Waste (6%)
Carbon Sequestration (0%)

Figure 15: Percent share of emissions reductions to meet 2020 and 2050 target
Sources: ICLEI data, HDR analysis

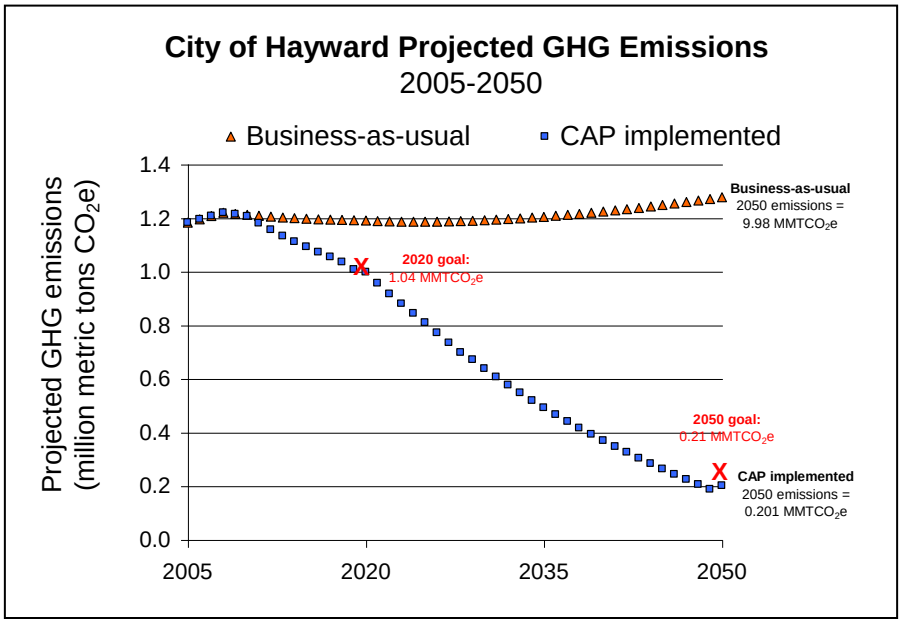


Figure 16: Projected emissions with and without CAP programs, 2005 to 2050
Sources: 1) ICLEI, 2) City analysis

Approach to Reducing Transportation-related Emissions

Review of transportation-related emissions sources

Hayward is known as the "Heart of the Bay" because of its central and convenient location in Alameda County. Hayward is 25 miles southeast of San Francisco, 14 miles south of Oakland, 26 miles north of San Jose and 10 miles west of the valley communities surrounding Pleasanton. Hayward is serviced by an extensive network of freeways and bus lines, has two BART stations (Hayward and South Hayward), an Amtrak station, and the Hayward Executive Airport. With easy access to numerous locations in the Bay Area, it is not surprising that Hayward has a strong commuter culture.

The 2000 Census revealed that only 28 percent of Hayward's employed residents worked in Hayward. Meaning, most of Hayward's residents commute out of the City to work. As residents commute to jobs outside the City, local jobs are being filled by non-residents. In spite of having relatively good transit options available, the most recent survey data shows that 74 percent of commuters drive alone to and from work (see Figure 17). In 2000, only 6 percent of commuters rode public transit. In high-density urban areas like San Francisco and Sacramento, the percent of commuters driving alone is as low as 30 – 40 percent. Less dense urban communities can reasonably expect that effective transportation management programs could enable them to reach a level where 60 percent or fewer commuters are traveling in single occupancy vehicles.[38] If the CAP is implemented according to the program goals and timeline presented in Appendix C and E, respectively, it is anticipated that only 56 percent of commuters will drive to and from work alone in 2050.

[38] The percentage of commuters traveling in single occupancy vehicles will depend on the type of jobs available in the area. If the community has a high percentage of jobs that require employees to drive from location to location (sales and services jobs for example) you can expect a higher percentage of commuters driving to work alone.

Hayward's transportation emissions are not only coming from commuters traveling into and out of the City. There are three major highways in Hayward on which commuters from around the Bay Area pass through Hayward on their route to destinations outside of Hayward. Sixty percent of Hayward's transportation-related emissions are attributed to vehicles traveling on these three State-owned highways, and a majority of these State-highway emissions come from people driving through the City without stopping. Hayward is depending on regional, state, and federal action to help reduce emissions from the State-owned highways.

The recent adoption of SB 375 could help Hayward collaborate with nearby cities and counties to promote regional efforts to reduce emissions from travel on local and State highways. SB 375 instructs CARB to work with metropolitan planning organizations to set regional goals for reducing GHG emissions from passenger vehicles. SB 375 also instructed CARB to assist metropolitan planning organizations in aligning their transportation, housing, and land-use plans to reduce the amount of vehicle miles traveled in their respective regions. Because such a large portion (38 percent) of Hayward's total GHG emissions come from travel on State highways, it is important that Hayward play an active role advocating for aggressive regional targets. Once targets are set, Hayward can show leadership by participating in efforts to develop and implement plans for achieving targets.[39,40]

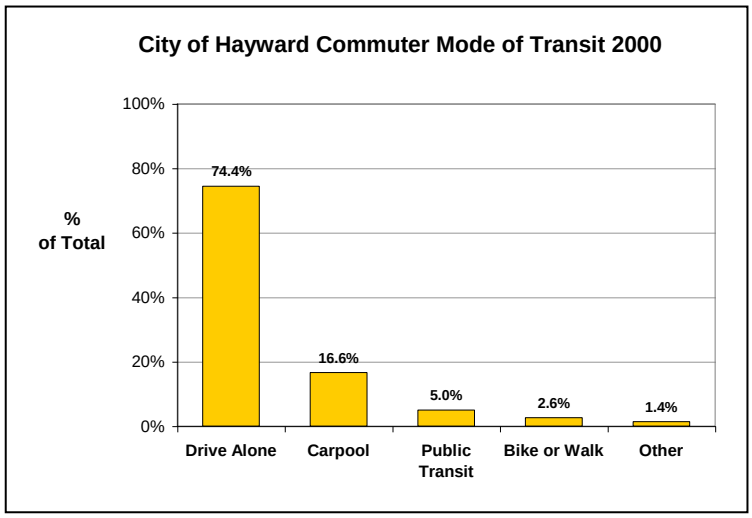


Figure 17: City of Hayward commuter mode of transit 2000
Source: ABAG

Approach for reducing transportation-related emissions

Reducing transportation-related emissions can be challenging because it will require citizens to change their behavior (by driving less, switching to transit for a significant percentage of trips, and purchasing fuel efficient or alternative fuel vehicles). Though challenging, it is well within Hayward's capability to make a positive change. The main approach to reducing transportation-related emissions is to first reduce the number of miles driven, then to decrease the carbon-intensity of the vehicle fleet.

[39] Senate Bill 375, Steinberg, Chapter 728, Statues of 2008. http://www.leginfo.ca.gov/pub/07-08/bill/sen/sb_0351-0400/sb_375_bill_20080930_chaptered.pdf
[40] CARB. SB 375 SB 375 - Regional GHG Emission Reduction Targets. http://www.arb.ca.gov/cc/cc.htm#sb375

Approach for Reducing Transportation-Related Emissions

1. **Reduce Vehicle Miles Traveled**
   When you don't have to drive, don't drive

2. **Improve Fuel Efficiency of Vehicles**
   If you have to drive, drive in a vehicle that does not emit a lot of greenhouse gases.

Reducing Energy-related Emissions from Buildings

Review of energy-related emissions sources

In light of California's stringent building energy efficiency policies, it is not surprising that per capita energy consumption in both the County of Alameda and the City of Hayward are significantly lower than the U.S. average level. In 2005, Hayward's per capita electricity consumption is 6.31 MWh/person whereas the U.S. average was 12.4 MWh/person (see Figure 18 and 19). This statistic indicates that Hayward has effectively slowed the growth of per capita energy consumption as compared to the rest of the United States.

The State of California has been committed to energy efficiency since the mid 1970s when legislation passed in response to the 1973 oil embargo. In the past 30 years California has set aggressive energy efficiency standards and has strictly enforced these standards.[41] As a result, California has enjoyed about 9 gigawatts of electricity savings. This amount of savings is equivalent to preventing the construction of eighteen average-sized power plants. Figure 19 illustrates that California's per capita electricity consumption has remained relatively constant since the mid 1970s while the US average per capita electricity consumption has continued to increase. In addition to saving electricity, efficiency standards have also minimized the amount of natural gas consumed in the state.

Greenhouse gas emissions reductions for electricity can be achieved in two ways: by reducing the total electricity used, and by reducing the carbon intensity of the electricity sources. As the per capita electricity use in California is significantly lower than the rest of the country, similarly, the average carbon intensity of the electricity resource mix in California (604 lbs/MWh in 2006) [42] is also significantly lower than that of the rest of the country (1334 lbs/MWh in 2006[43]). This is partly due to the aggressive Renewable Portfolio Standard that was adopted by the state in 2002, and amended in 2003 and 2006, which requires that 20 percent of retail electricity sales shall be served with eligible renewable energy resources by 2010. Governor Schwarzenegger has set a longer-term state goal of 33 percent by 2020, and currently the California Public Utilities Commission (CPUC) and the California Energy Commission (CEC) are considering ways to achieve that goal. Eligible renewable resources include solar thermal electric, photovoltaics, landfill gas, wind, biomass, geothermal electric, municipal solid waste, anaerobic digestion, small hydroelectric, tidal energy, wave energy, ocean thermal, biodiesel, and fuel cells using renewable fuels.

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[41] The California's Appliance Efficiency Program (Title 20) was established in 1976 and the California's Energy Efficiency Standards for Residential and Nonresidential Buildings (Title 24 Standards) were established in 1978. www.energy.ca.gov

[42] http://www.eia.doe.gov/cneaf/electricity/st_profiles/sep2006.pdf
CA net generation 2006 = 216,798,688
CO2 = 59,389 thousand $MTCO_2$

[43] http://www.eia.doe.gov/cneaf/electricity/st_profiles/sep2006.pdf
US net generation 2006 = 4,064,702,227 MWh
CO2 = 2,459,800 thousand MTCO2

The definitions of eligibility for many of these resources (especially landfill gas, biomass, municipal solid waste, anaerobic digestion, small hydroelectric, biodiesel, fuel cells, and renewable fuels) are subject to clear restrictions, for greenhouse gas emissions accounting purposes. See the CEC RPS Eligibility Guidebook for more information[44]. Renewable electricity is considered to produce net zero greenhouse gas emissions, so all state progress towards the RPS target will continue to reduce the carbon intensity of electricity. This will contribute to reducing the carbon intensity of electricity in Hayward as well.

The majority of electricity and natural gas consumed in Hayward is used for space heating and cooking. Pumping water is also a major electricity user; reducing the use of water therefore also saves energy. Many homes in Hayward are now more than 20 years old and thus are equipped with older less efficient fixtures and appliances. The Pacific Institute estimates that while great progress has been made in California, "Indoor residential use could be reduced by approximately another 40%... by replacing remaining inefficient toilets, washing machines, showerheads, and dishwashers, and by reducing the level of leaks, even without improvements in technology." [45]

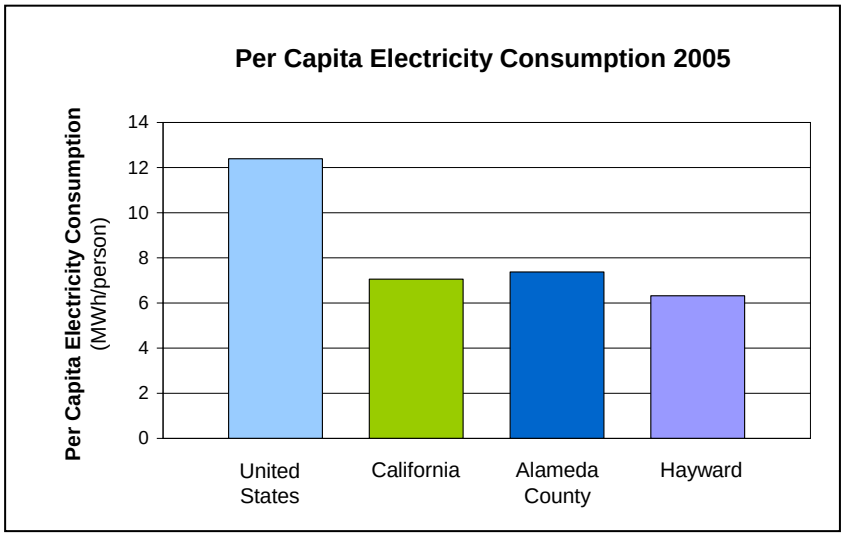

Figure 18: Per capita electricity consumption in 2005

Sources: (1) EIA. Electric Power Annual with data for 2006. Current and Historical Monthly Retail Sales, Revenues, and Average Retail Price by state and by Sector (Form EIA-826). Released 2007. (2) U.S. Census Bureau, Population Division, Interim state Population Projections, 2005. Internet Released 2005. (3) U.S. Census Bureau. California Population of Counties by Decennial Census: 1900 to 1990. Released 1995.(4) California Energy Commission. Electricity Consumption by County. 2006. http://ecdms.energy.ca.gov/elecbycounty.asp (5) Association of Bay Area Governments. Projections 2007: Forecasts for the San Francisco Bay Area to the Year 2035. (6) ICLEI. Hayward Baseline Emissions Inventory. 2005.

[44] http://www.energy.ca.gov/2007publications/CEC-300-2007-006/CEC-300-2007-006-ED3-CMF.PDF

[45] Pacific Institute for Studies in Development, Environment, and Security, "Waste Not, Want Not: The Potential for Urban Water Conservation in California." November 2003

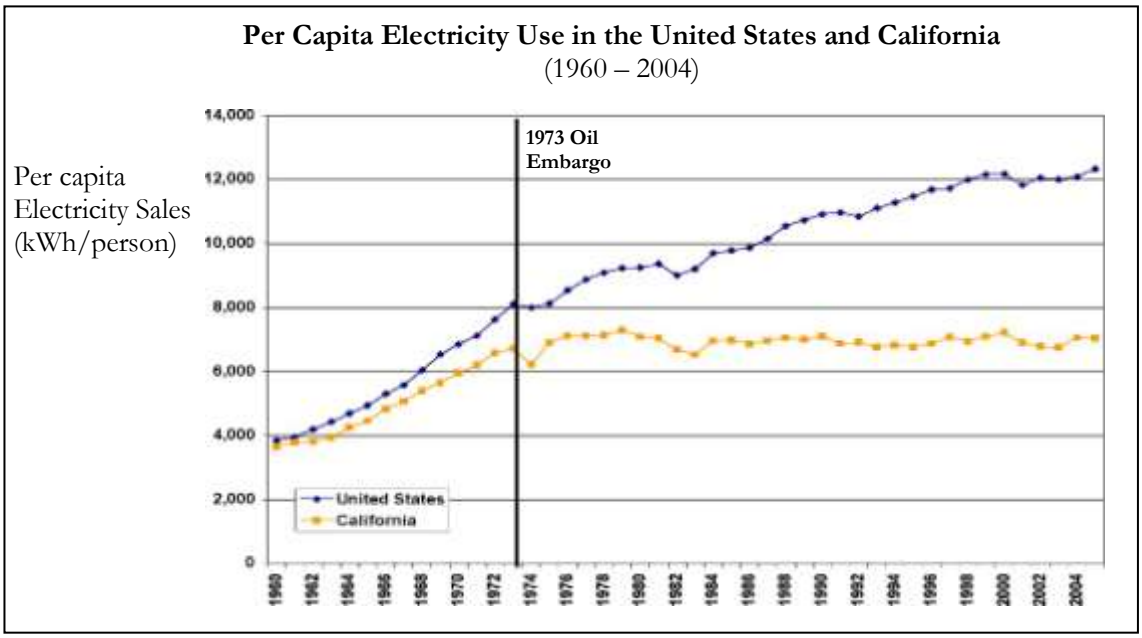

Figure 19: Per capita electricity use in United States and California
Source: California Energy Commission. 2007 Integrated Energy Policy Report. December 5, 2007. Publication # CEC-100-2007-008-CMF.2005c

Approach for reducing energy-related emissions

There are several steps to reducing emissions resulting from energy used in buildings. The cost-effectiveness of different emissions reduction strategies have been quantified in many historical state-sponsored technical studies. Since 2003, California's energy policy has recognized a *loading order*[46] as the preferred sequence for meeting growing electricity needs. The loading order specifies that the first resources that should be added are energy efficiency and demand response; next would be renewable energy and distributed generation; and third, clean fossil-fueled sources and infrastructure improvement. This strategy helps to reduce CO_2 emissions and diversify sources of energy supply.[47]

Energy Efficiency

Energy efficiency is the least expensive strategy for meeting climate goals. Energy should be conserved by minimizing the amount of unnecessary energy consumption. For example, the energy used to heat homes will be used more efficiently if weather-stripping is added to drafty windows to prevent leakage of warm air before heating the room. Next, when consuming energy for necessary functions, energy should be used as efficiently as possible, for example through the use of more efficient lighting fixtures.

Renewable Energy

Renewable resources are essential for meeting greenhouse gas emissions reduction goals, especially for the emissions from energy use that cannot be avoided through other efficiency measures. Over the last three decades, the state has built one of the largest and most diverse renewable generation portfolios in the world. Currently, about 11 percent of the state's electricity is from renewable energy sources such as

[46] The loading order, adopted as the state's energy policy, is the accepted protocol that describes the priority sequence for actions to address increasing energy needs.
[47] CEC Integrated Energy Policy Report 2007. http://www.energy.ca.gov/2007publications/CEC-100-2007-008/CEC-100-2007-008-CMF-ES.PDF

solar, wind, geothermal, and biomass. Renewable energy can be used to meet on-site energy needs – for example, solar arrays and wind turbines can be installed on building sites. Electricity from such renewable sources produces no greenhouse gas emissions, whereas in 2005, the emission factor of electricity from the local utility was 429 pounds of CO_2e per MWh.[48] On-site renewable electricity can provide the deep emissions cuts for energy use that cannot be avoided with traditional efficiency measures.

If it is not possible to produce electricity on-site, the next approach is to produce renewable electricity off-site. Because the City may own some sites with high renewable energy potential, but low energy demand, and some other sites with high energy demand, but low renewable energy potential, it may be attractive to install remote renewable energy facilities on resource-rich sites. California AB 2466, which was signed into law in September 2008 and became effective in January 1009, allows local governments to produce up to 1 MW of renewable energy on one site within its geographic boundaries and generate offsets that can be used to credit one or more electricity meters within the same geographic boundary. This legislation gives local governments some flexibility in how they can meet renewable generation goals.

The City can also add its voice to efforts to increase the amount of renewable energy supplied by the local utility. California has set a State-wide goal of having 33 percent of electricity generated from renewable sources by 2020.[49] It is not yet clear whether the utilities will reach this state-mandated renewable energy target by 2020. While the utilities' progress toward their state goal is out of the City's control, there are still actions that can be taken on a local scale to ensure real local progress. Whether or not the utilities reach their state-mandated renewable procurement target, the City can set its own independent target, for generating a certain fraction of municipal or City-wide building energy use from local renewable energy sources such as on-site solar and wind, within the same time frame. This helps mitigate the risk of not achieving the state's renewable energy goals, because if the utilities do not meet their target, at least the local target was reached, and if the utilities succeed in meeting their target, local generation will compound the success. This strategy also sets an example for the state, demonstrating that it is possible to make significant steps towards 100 percent renewable electricity generation, and would pre-empt any state-level arguments that may be made to the contrary.

Water Conservation and Energy Savings

In 2005, Hayward used 8.5 GWh of electricity and 29,000 therms of natural gas to pump water, maintain consistent water supply, and to treat water. This does not include energy used to heat water in Hayward's buildings. If Hayward reduces the amount of water it uses, the energy requirements associated with water use will decrease. This energy savings will also translate to emissions savings. For the purpose of this plan, the City grouped water conservation with energy conservation. It is assumed that the energy conservation goals established in this Plan will be achieved, in part, by conserving water.

Water-related emissions are a larger portion of the Municipal GHG footprint: The City's water and wastewater systems contribute 21 percent of the municipal GHG production. With the exception of the waste management fleet, water-related emissions are the largest contributor to the Municipal footprint. In addition, there may be additional indirect GHG impacts due to chemical usage and biosolids disposal. Based on audit results of over one hundred water and wastewater systems, 10-20 percent savings in energy and chemicals can be achieved by thoroughly optimizing processes. The City could also realize

[48] ICLEI. Hayward Baseline Emissions Inventory.

[49] Governor Arnold Schwarzenegger signed Executive Order S-14-08 on November 11, 2008. The executive order aims to streamline California's renewable energy project approval process and increase the state's Renewable Energy Standard to 33 percent renewable power by 2020.

benefits of cost savings. The water and wastewater systems represent 38 percent of the City's energy costs and are by far the largest single energy sub sector of the municipal system.

Approach for Reducing Energy-Related Emissions

1. **Conserve Energy**
   When you don't need the energy, don't use it
2. **Increase Energy Efficiency**
   When you do need energy – use it efficiently.
3. **Use On-site Renewable Energy**
   Use energy generated from low-emissions or no-emissions sources like solar, wind, or geothermal, that are attached to the building (on-site).
4. **Use Off-site Renewable Energy**
   When you can't produce needed energy on-site, produce low-or no-emissions energy elsewhere (off-site).

Reducing Solid Waste-Related Emissions

Review of solid-waste-related emissions sources

Hayward has responded to the mounting pressure to extend the useful life of local landfills by implementing a variety of recycling programs available to residents and businesses. Hayward has committed to reducing waste sent to the landfill by 75 percent and has deployed a number of strategies toward this goal. Hayward's diversion rates have increased from 41 percent in 1995 to 65 percent in 2006 (see Figure 20). Recycling programs significantly reduce the transportation costs and the energy required to manufacture products made of recycled content, rather than manufacturing and shipping products made only of virgin materials. In general, manufacturing products made of recycled materials require less energy than extracting and processing raw materials, such as the savings realized when recycling aluminum cans. Composting programs reduce the amount of organic material in the landfill and thereby help reduce methane production in the landfill. Methane is a greenhouse gas that is 21 times more potent than carbon dioxide in its ability to cause warming. Although landfills attempt to capture methane, much of the methane generated in landfills finds its way into the atmosphere. Programs that divert organic materials from the landfill also reduce GHG emissions from the landfill because the amount of methane generated in a landfill is proportional to the amount of organic material deposited in the landfill.

Methodologies for quantifying solid-waste-related emissions from the waste sector are not well refined. ICLEI's methodology calculates emissions from methane that is created when organic materials break down in landfills, but the standard methodology does not account for emissions, and potential emissions savings, that occur upstream from the landfill.[50] For example, aluminum does not create any methane when it decomposes in the landfill, so there are no emissions associated with disposing of the can in the landfill. However, less energy is required to manufacture a can made out of recycled aluminum rather than virgin aluminum. Thus, the emissions benefit of recycling the can is linked to materials production, but these benefits are not accounted for in current emissions quantification methodologies. Better

[50] EPA has studied the impacts of landfilling versus recycling, composting and source reduction, but these emissions and emissions savings have not been incorporated into ICLEI's calculation methods yet. The source for EPA's study is: EPA. Solid Waste Management and Greenhouse Gases: A Life-Cycle Assessment of Emissions and Sinks. Third edition. 2006.

estimates of upstream emissions savings will likely be incorporated into the next generation of emissions modeling methodologies. The CAP makes recommendations on how to reduce all solid-waste-related emissions, not just the waste-related emissions that we know how to quantify.

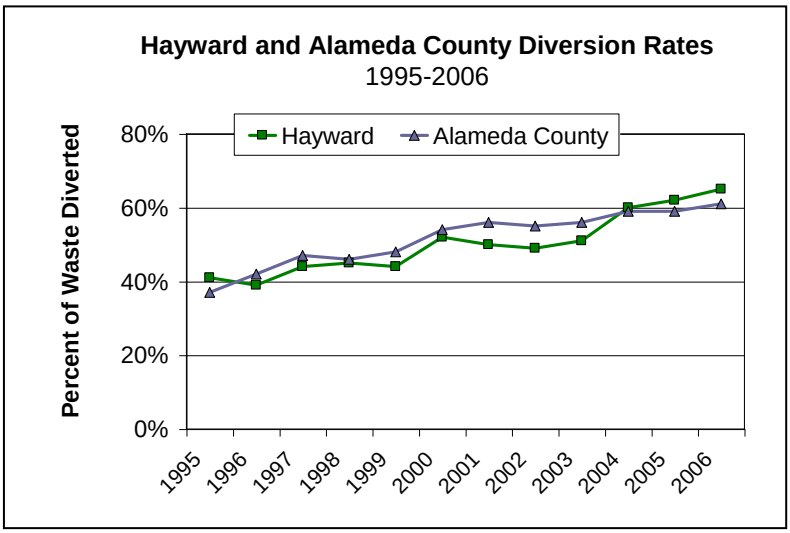

Figure 20: Diversion Rates 1995 - 2006
Source: Stopwaste.org

Approach for reducing solid-waste-related emissions

The approach for reducing waste-related emissions is to first avoid creating waste to the extent possible. One way an individual or business can do this is by choosing to purchase items that are not overly packaged. The next step is to increase the amount of materials being reused and recycled. Reusing and recycling reduces emissions upstream from the landfill by eliminating demand for virgin materials and thereby reducing energy required to extract and process raw materials. The next approach is to keep organic materials out of the landfill. Minimizing the amount of organic material in the landfill will also minimize the amount of methane emitted from the landfill.

Approach for Reducing Waste-Related Emissions

1. **Reduce Waste**
   Avoid creating waste when possible.

2. **Reuse and Recycle What you Can**
   If you have to create waste, use things that can be reused or recycled – and be sure you actually reuse or recycle.

3. **Decrease Amount of Organics Going to the Landfill**
   If you have to create organic waste, avoid sending organics to the landfill where organics decompose into methane: a potent global warming gas.

Supplement Emissions Reductions Activities with Carbon Offsets

With the knowledge that carbon offsets will likely play a significant role in the state-wide emissions reductions, Hayward could benefit from familiarizing itself with carbon offsets and the role offsets may have in future efforts to reduce emissions on the local level. The State of California plans on developing a role for offsets within the regional cap-and-trade system that is scheduled to be in place by 2012. CARB is currently working with the Western Climate Initiative (WCI) to develop this cap-and-trade program. To ensure that emissions reductions occurring within the sector that is capped, CARB will likely limit the amount of emissions reductions that can be met through purchasing offsets to 49 percent of the total required emissions reductions. CARB has also indicated that any offset used to meet regulatory requirements must be quantified based on board-approved methodologies.

Offsets will not contribute to a verifiable reduction in the City's GHG footprint; however, they encourage growth in carbon mitigation projects such as renewable energy, reforestation, and methane capture. Hayward might decide to purchase offsets to help meet targets or to achieve carbon neutrality [51]; however, offsets should be seen as a strategy to complement efforts to reduce emissions, not as an alternative to reducing emissions from activities taking place within the City. Reducing emissions internally is the best way to show commitment to addressing climate change and the only way to actually reduce the City's reported footprint.

Until state and regional entities develop regulations and standards for carbon offsets, offset markets will remain voluntary. Because these markets for voluntary carbon offsets are relatively new and there is no widely accepted standard for what qualifies as an offset, and because offsets are an intangible product, offset purchasers often have a difficult time deciphering high-quality offsets from low-quality offsets. Until there is an impartial way to evaluate the quality of offsets, purchasers will be responsible for choosing their offsets wisely. The good news is that as the state develops a role for offsets in the AB 32 implementation, purchasing quality offsets will probably become easier. In the meantime, the City can follow some basic guidelines when selecting quality offsets to purchase. The Offset Quality Initiative was founded in November 2007 to provide leadership on greenhouse gas offset policy and best practices. It is a collaborative, consensus-based effort that brings together the collective expertise of its six nonprofit member organizations: The Climate Trust, Pew Center on Global Climate Change, California Climate Action Registry, the Environmental Resources Trust, Greenhouse Gas Management Institute, and The Climate Group.[52] In 2008, the Offset Quality Initiative published a whitepaper that intended to provide policymakers with practical recommendations regarding the integration of offsets into emerging regulatory systems.[53] The whitepaper identified nine criteria to consider when determining if an offset is of high quality. The Whitepaper states that a high quality offset should:

1. **Be Real:** represents actual emissions through sound accounting practices
2. **Be Additional:** can only be counted if from a project that would not have otherwise occurred without the incentive provided by offset credits. In other words, if the project is driven by regulatory requirements or is part of "business-as-usual" operations, the reduced CO_2e emissions cannot be counted/sold as offsets.

[51] Carbon neutrality is defined as net aero GHG emissions. Because it is typically not technically feasible to eliminate all GHG emissions, offsets can be used to equalize emissions that cannot be feasibly eliminated.
[52] Offset Quality Initiative. http://www.offsetqualityinitiative.org
[53] Offset Quality Initiative. *Ensuring Quality Offsets: Integrating High Quality Greenhouse Gas Offsets Into North American Cap-and-Trade Policy*. July 2008. http://www.pewclimate.org/docUploads/OQI-Ensuring-Offset-Quality-white-paper.pdf

3. **Be Based on a Realistic Baseline:** an established baseline following a credible project specific approach or standardized sector approach.
4. **Be Quantified and Monitored:** project includes a plan to monitor and quantify offsets following the World Resource Institute's Greenhouse Gas Protocol for Project Accounting and ISO 14064 – Part 2.
5. **Be Independently Verified:** offsets verified by a qualified, independent, third party verifier according to approved methodologies.
6. **Be Unambiguously Owned:** ownership of the offsets should be uncontested; transfer should be documented and transparent, credits must be serialized and accounted for in a registry or other approved tracking system.
7. **Address leakage:** include consideration of increased emissions outside of the projects boundary that occur as a result of the project's implementation.
8. **Address permanence:** address the risk that emission reductions generated by certain offset project types can be reversed (applicable to GHG regulatory regimes).
9. **Do no net harm:** should not cause or contribute to adverse affects on human health or the environment, but instead provide co-benefits whenever possible.

If Hayward decides to purchase offsets, then offsets would be purchased on an annual basis. Offsets will vary in price depending on the type of offset (for example, an offset that funds a reforestation project will cost a different amount than an offset that funds a renewable energy project). At the time the CAP was released, offsets were typically priced at between \$2-\$13/ton CO_2.[54] Depending on how the offset program is designed, Hayward may be responsible for providing funding to purchase offsets or the program could be designed so developers, residents, or businesses would pay for offsets.

When developing a protocol for purchasing offsets, Hayward may consider not only purchasing offsets for its own municipal operations, but also offering a program through which employees, residents and local businesses can purchase voluntary offsets. Offering an offset purchasing program to residents and businesses will help raise awareness about individuals' contribution to GHG emissions while making it easier to purchase high-quality offsets. An offset purchasing program should not replace the City's efforts to encourage residents and businesses to reduce emissions internally.

[54] Carbon offsets traded on the Chicago Climate Exchange (http://www.chicagoclimatex.com) cost around \$2/metric ton CO_2 and offsets traded on the less European Climate Exchange (http://www.europeanclimateexchange.com) cost around \$13/metric ton CO_2 in January 2009.

Section 5 – Emissions Reduction Plan

Section 5 presents nine strategies for reducing emissions in Hayward; each strategy contains several actions that Hayward can deploy to reduce GHG emissions.

The nine strategies are:

Strategy 1 Transportation and Land Use – Reduce Vehicle Miles Traveled
Strategy 2 Transportation: Decrease the Carbon-Intensity of Vehicles
Strategy 3 Energy: Improve Energy Performance of Existing Buildings
Strategy 4 Energy: Improve Energy Performance of New Buildings
Strategy 5 Energy: Use Renewable Energy
Strategy 6 Solid Waste: Increase Waste Reduction and Recycling
Strategy 7 Sequester Carbon
Strategy 8 Climate Change Adaptation
Strategy 9 Engage and Educate Community

Strategy 1: Transportation and Land Use – Reduce Vehicle Miles Traveled

Goal

The goal of Strategy 1 is to reduce vehicle miles traveled (VMT) by encouraging residents and employees to use alternative modes of transit, by improving the effectiveness of the transportation circulation system, and through land-use and zoning mechanisms. The long-term goals of Strategy 1 are to:

- Reduce VMT of passenger vehicles to 30 percent below business-as-usual projections by 2050
- Reduce VMT of heavy trucks to 10 percent below business-as-usual projections by 2050 [55]

Strategy 1 is an important strategy because it addresses the specific recommendations CARB made to local governments in the AB 32 Scoping Plan. The Scoping plan points out that in order to meet state-wide emissions targets, local governments will have to make land use planning and urban growth decisions that minimize emissions. The Scoping Plan states "local governments have the primary authority to plan, zone, approve, and permit how and where land is developed to accommodate population growth and the changing needs of their jurisdictions."[56] The decisions that local governments make will have a large impact on GHG emissions, particularly on emissions from personal automobiles. The State's desire for local governments to take action on reducing VMT was reiterated by the adoption of SB 375 on September 30, 2008. As discussed in Sections 1 and 4, SB 375 sets up a framework for local governments and regional planning organizations to work together to reduce GHG emissions from passenger vehicles. The bill requires CARB to set regional targets to reduce GHG emissions from passenger vehicles. It is anticipated that setting regional emissions targets and subsequently working to

[55] It is not clear how Hayward will address reducing emissions from heavy trucks. However, emissions from heavy trucks account for 13 percent of 2005 emissions if state roads are included and 8 percent of 2005 emissions if state roads are not included. If emissions from trucks are not addressed, the City will not meet its 2050 goal.
[56] California Air Resources Board, 2008. Draft AB 32 Scoping Plan. http://www.arb.ca.gov/cc/scopingplan/scopingplan.htm. Page 27.

meet the targets, will increase the amount of regional collaboration on transportation-planning initiatives and will in turn, further reduce VMT and associated emissions in Hayward. [57]

If Hayward wants to be fully supportive of state-wide goals, the City should work diligently to implement the Strategy 1 actions. The City has already adopted a number of land use and zoning protocols that will help reduce emissions, including smart growth principles. The land use and zoning actions presented in Strategy 1 focus on how Hayward can continue its efforts to reduce travel in automobiles.

Ease of implementation

The Brookings Institute estimates that about half of the development that will exist in 2030 will have been built between 2000 and 2030.[58] If this estimate is correct, Hayward should be anticipating a substantial amount of new development to take place in the coming decades. Hayward, and other local governments, can use zoning and land-use mechanisms in parallel with development standards to influence how new developments will address the City's goal of reducing VMT.

Many Strategy 1 actions require individual initiatives and different choices, such as walking, biking, and choosing public transit, instead of driving. Measures to encourage these changes include: incentives, programs, and policies by businesses, agencies, and other organizations. This may include ride sharing programs, subsidized transit passes, and locating employment near transit and activity centers; institutional policies and programs, including K-12 health educational classes and promotional materials and venues; and governmental policies, programs, guidelines, and standards, such as municipal transit policies and zoning code standards that cap the maximum rather than minimum number of parking requirements. Several factors will greatly influence the ease with which actions that reduce VMT can be implemented. These factors include:

Fuel Prices

Rising fuel prices reduced driving frequency and trip length, whereas fuel price reductions spark an increase in driving. A UC Davis study shows that increasing auto costs by 50 percent decreased VMT by 16 percent.[59] It is clear that implementation will be greatly influenced by oil costs and other driving expenses.[60]

Regional and State Collaboration

To achieve the required reduction in VMT, Hayward will have to collaborate with other communities within the region, and with the state.

Resistance to Fees

Though drivers resist increases in auto operating costs and parking fees, reducing VMT by initiating new fees and taxes, such as parking fees, vehicle purchase and registration taxes, or fuel taxes, these fees and taxes discourage people from driving. Resistance to new fees could impede progress towards reducing VMT. One way to alleviate this potential impediment is to focus on financial incentives to reward

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[57] Senate Bill 375, Steinberg, Chapter 728, Statues of 2008. http://www.leginfo.ca.gov/pub/07-08/bill/sen/sb_0351-0400/sb_375_bill_20080930_chaptered.pdf

[58] Brookings Institute. Arthur Institute. Arthur C. Nelson. http://www.citymayors.com/development/built_envrionment.usa.html

[59] Chester, Mikhail V., Life-cycle Environmental Inventory of Passenger Transportation in the United States. Institute of Transportation Studies, University of California Berkeley, August 1, 2008. The author's website includes related presentations, news coverage, and previous draft versions

[60] ICF International, Inc. Linda Bailey, Patricia L. Mokhtarian, and Andrew Little. The Broader Connection between Public Transportation, Energy Conservation and Greenhouse Gas Reduction, March 2008.

"good" behaviors rather than financial disincentives to punish "bad" behaviors. A survey conducted by the 1992 University of California, Irvine, the *Orange County Annual Survey* asked employed solo drivers to rate their likelihood of changing from solo driving in response to various fees and incentives. Fewer say they would be very likely to stop solo driving if they were subject to fees than if their employers paid them a cash bonus for no longer driving alone. [61, 62]

Challenges in Integrating Expansion of Transit and Transit-oriented Development

Expanded transit with land use intensification around light rail (i.e., BART) stations generally decreases VMT about 5% with the collateral benefit of decreased travel costs. Generally, increasing land use density succeeds only when walking and biking modes are adequate. Thus, support for implementation will depend on integrating both the form of development and the convenience, economy, safety, and the attractiveness of its mobility systems.[63]

Competition with Roadway Infrastructure Improvements

Expanding road capacity generally increases auto travel and therefore, also increases emissions. In particular, new or expanded HOV lanes on freeways increase travel, so both provide significant constraints to other actions that reduce driving. As a result, ease of implementation will depend on other regional and State transportation decisions. Conversely, transportation demand management[64] provides a proven method for reducing local VMT, saving fuel, and reducing congestion, so its implementation should be supported by the community.[65]

Perceived Threat of Climate Change

A well-documented and significant shift in the observable impact of climate changes—the reporting of the collapse of the Antarctic Ice Sheets, for example—could greatly accelerate the public's willingness to change travel behavior, and support governmental policies and standards for reducing emissions. But absent a dramatic climate change event reported by the mainstream media, or a displacement of climate change news by economic or political news, for example, will likely reduce the ease of implementation.

Realizing Combined Benefits of Land Use, Transit, and Mobility Strategies

An American Public Transportation Association (APTA) study on public transit and land use found that switching from an auto trip to a transit trip not only saves a certain amount of fuel, but also the presence of transit itself helps create fuel-efficient neighborhoods. APTA found that having transit enabled built environments where people drove less, walked more, and used transit more. The secondary effect was twice the magnitude of the primary effect.[66] Thus, educating the public and policy makers on the combined benefits of both land use and transportation strategies will make implementation easier.

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[61] Incentive or disincentive (% responding that it is very likely that incentive or disincentive would get them to stop driving along): parking fee (20%, smog fee (17%), congestion fee (16%), cash bonus to stop driving (28%), more public transit (33%) more carpools to work (35%). US Department of Transportation has published more information on Intelligent Transportation Systems (ITS): www.its.dot.gov, www.itsoverview.its.dot.gov

[62] US Department of Transportation has published more information on Intelligent Transportation Systems (ITS): www.its.dot.gov, www.itsoverview.its.dot.gov

[63] University of California, Davis. Robert A. Johnston. Review of U.S. and European Regional Modeling Studies of Policies Intended to Reduce Motorized Travel, Fuel Use, and Emissions. August 2006

[64] Transportation demand management is the application of strategies and policies to reduce demand for automobile travel or manage the demand for automobile travel at certain times and locations.

[65] Association for Commuter Transportation. *The Role Of Demand-Side Strategies: Mitigating Traffic Congestion*. 2004. Prepared for the Federal Highway Administration. Available from http://tmi.cob.fsu.edu/act/FHWA_Cong_Mitigation_11%202%2004.pdf.

[66] Journal of Public Transportation. *Transit Price Elasticities and Cross-Elasticities.* 2004, Vol. 7, No. 2, pp. 37-58. Available from www.nctr.usf.edu/jpt/pdf/JPT 7-2 Litman.pdf.

Estimated GHG Emissions Reductions

If program goals are achieved, it is estimated that Strategy 1 actions will result in an annual emissions savings of approximately 9,626 metric tons CO_2e/year in 2020 and 99,174 metric tons CO_2e/year in 2050, as measured from BAU projections. It is estimated that if long-term goals are achieved, emissions savings from Strategy 1 will contribute 6.2 percent of the emissions reductions needed to meet the 2020 target and 9.3 percent of the emissions reductions needed to meet the 2050 target. Estimated annual emissions reductions from specific actions are presented in Appendix B.

In 2005, gasoline-powered vehicles traveled a total distance of 1.29 billion miles on Hayward's roadways and diesel-powered vehicles traveled a total of 95 million miles.[67] As a result, 734,085 metric tons of CO_2e was emitted into the atmosphere. Reducing VMT will significantly decrease GHG emissions; for example, cutting the total VMT in gasoline-powered vehicles in half, to 615 million miles, would reduce transportation-related emissions by 40 percent to 443,065 metric tons of CO_2e. This alone is enough to achieve Hayward's 2020 reduction target.

Costs and Additional Benefits

Cost

Investment costs associated with implementing Strategy 1 include paying City staff to develop programs that aim to reduce VMT. The ongoing operation and maintenance costs include paying one person of a staff of people to coordinate all of numerous commuter programs and to administer the programs. Depending on how the City develops the programs, the City may not pay for operational costs. This is especially true if a third party organization is responsible for managing and coordinating all of Hayward's transportation-related programs.

To be successful, residents and businesses will have to participate in efforts to reduce VMT. To achieve the level of participation that is necessary to meet aggressive emissions reductions goals, the City will have to pay for ongoing outreach, education, and marketing.

Additional Benefits

Reducing VMT will result in a smaller amount of fuel burned within Hayward. Reduced fuel consumption will result in a reduction of not only GHGs but a number of hazardous air pollutants including nitrogen oxides, sulfur oxides, ozone, and particulate matter. These hazardous air pollutants cause, among other things, acid rain, smog, and increased asthma rates and other health issues. Reducing fuel consumption could result in health benefits and improved local and regional air quality.

Additional Benefits to Public Health

Emissions from motor vehicles include pollutants that impact regional and local air quality. Near-source air pollution impacts have the most serious health consequences and are more akin to occupational exposures. If the pollutant's travel time to a person is more than three minutes from the exhaust pipe, most of the health risk is greatly reduced. Transportation emissions are not only diluted and dispersed fairly rapidly, but they evolve even more rapidly. Fresh mobile air pollutants evolve furiously in the first three seconds and subsequently into much less dangerous size, composition, and concentration the first three minutes after exhaust. The ease of implementing reduction in VMT will be dependent on the success in educating the public and policy makers about health implications of tailpipe emissions from proximity to traffic congestion for drivers, passengers, cyclists, and pedestrians. For example,

[67] ICLEI. Hayward Baseline Emissions Inventory. VMT data from Metropolitan Transportation Commission

educational tools can be used to illustrate that those living within 100 yards of major congested highways or City streets can have occupational-scale exposures similar to long-haul truckers, urban delivery van drivers, or diesel rail engineers.

Strategy 1 Actions

Community-wide actions

Increase the Use of Alternative Modes of Transportation

Action 1.1 Assist businesses in developing and implementing commuter benefits programs. A commuter benefits program might consist of an offer to provide discounted or subsidized transit passes, emergency ride home programs, participation in commuter rideshare programs, parking cash-out or parking pricing programs, or tax credits for bike commuters.

Action 1.2 Assist businesses in developing and implementing car sharing programs, such as Zip Car® or City Car Share, and encourage large employers such as the colleges and Hayward Unified School District (HUSD) to implement such programs.

Action 1.3 Modify City parking ordinances to incentivize walking, biking, and public transit by employing parking strategies that include adding bicycle parking, increasing the number of parking spots with time limits, adjusting parking time limits to correspond with adjacent building uses, increasing the number of paid parking spaces, and making space location and fees consistent with demand targets.

Improve Effectiveness of Transportation Circulation System

Action 1.4 Collaborate with BART and AC Transit to explore short- and long-term opportunities to expand services (for example, to extend rapid bus service from Bay Fair to the South Hayward BART Station) and pursue a hydrogen fueling station for both buses and personal vehicle use, improve transit stations by expanding amenities at stations, and improve bus stops by adding benches and shelters.

Action 1.5 Continue to implement and expand the City-wide bicycle master plan through aggressive pursuit of grants and other sources of funding which could be used to expand bike lanes and bike parking facilities. Assist businesses in creating or expanding bike-to-work incentive programs, including bike sharing, adequate secure bike parking, bike maps of the City, bike safety classes, and other incentives that reward bikers.

Action 1.6 Develop and implement a City-wide pedestrian master plan that improves the convenience, safety, and attractiveness of and access to pedestrian ways. Update the plan on a regular basis to ensure that walkability improves over time.

Action 1.7 Update the City's Circulation Element of the General Plan to locate, evaluate appropriate transit modes such as street car, bus rapid transit, or other modes that eventually decrease the need for personal vehicles for travel within the City. The Plan should integrate pedestrian, bicycles, and transit modes with motor and other vehicles. When proposing changes to the transportation system, the City should consider the climate impacts and give preference to solutions that reduce auto dependency and minimize GHG emissions.

Action 1.8 Improve traffic flow and reduce vehicle idling by means of synchronized signals, transit and emergency signal priority, and other traffic flow management techniques. When developing the program, Hayward should work with the Metropolitan Transportation Commission and the Alameda County Congestion Management Agency to expand roadway and intersection performance metrics to include pedestrian, bicycle, and level of service criteria to measure quantitative and qualitative metrics such as accessibility, intersection crossing times, and other relevant data. It is recommended that Hayward use evaluation criteria that consider costs and GHG reduction benefits of biking, walking, carpooling, and public transit.

Utilize Zoning & Land-use Mechanisms to Minimize Need for Auto Transportation

Action 1.9 In order to encourage non-automotive modes of travel, continue to implement and update the General Plan Circulation and Land Use Elements pertaining to smart growth principles that support higher-density, mixed-use, and well-designed development in areas within ½ mile of transit stations and ¼ mile of major bus routes. Amend the Municipal Code Zoning, Subdivision, and Off-Street Parking Standards to incorporate smart growth principles, policies, and development standards consistent with recommendations provided in the Appendix H and I of the CAP.

Action 1.10 Explore the development of zoning and development standards that consider both the land uses and the urban design and form of buildings and public space, where the new standards will result in reduced GHG emissions.

Action 1.11 Explore potential strategies related to the creation of additional affordable housing to sell to buyers employed in Hayward, but who currently reside in other areas and commute to work in Hayward. For example, consider implementing a community land trust to purchase and resell foreclosed properties. The program could potentially be coordinated with local businesses.

Action 1.12 Develop an incentive plan to maximize the number of residents that work within the City, and encourage filling local jobs first with local residents, to eliminate commutes.

Municipal Actions

Action 1.13 Reinstate commuter benefits such as Commuter Checks to City employees, and when possible expand or develop other commuter benefits programs such as parking cash-out or parking pricing programs, or taking advantage of the new tax credit for biking to work. The City will amend Administrative Rule 2.26 to reflect current transportation demand management opportunities.

Action 1.14 Explore options in developing a car-sharing and/or bike-sharing program for City employees. If private organizations like Zip Car are not interested in managing the car sharing program, it could be administered by the City as a benefit available to City employees only. A bike share program would also be administered by the City as a benefit to City employees.

Action 1.15 When making decisions about where to rent or build new City facilities, give preference to locations that are accessible to an existing public transit line.

Summary Table

Table 3: Strategy 1 – Transportation and Land Use: Reduce Vehicle Miles Traveled

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Community-wide Actions				
Increase the Use of Alternative Modes of Transportation				
Action 1.1	Assist businesses in developing and implementing commuter benefits programs. A commuter benefits program might consist of an offer to provide discounted or subsidized transit passes, emergency ride home programs, participation in commuter rideshare programs, parking cash-out or parking pricing programs, or tax credits for bike commuters.	• Success of program is highly dependent on how much marketing and outreach is dedicated to the program. • Implementation will be greatly influenced by oil costs and other driving expenses. • Regional and State transportation decisions on increasing road capacity could play a part in the perception of a need for commuter programs. If there is more road capacity, then commuters are less likely to participate in these programs. • The City used the Commuter Check program in the past. Future implementation will require careful consideration of administrative costs against potential tax benefits.	• The Green Bean Commuting Newsletter by Accor Services provides information on commuter benefits. http://accorservicesusa.com/enews.aspx • This document describes a recent commuter survey in which 44 percent of respondents report that rising fuel prices have affected their travel decisions: http://www.accorservicesusa.com/Images/email/commuting_habit_change.jpg	**Costs** • Salary for City staff to develop programs, set up a program operations plan, and seed funding • Little or no operation costs. • **Additional Benefits** • Decreased commuting costs; reduced traffic congestion. • Improved air quality.
Action 1.2	Assist businesses in developing and implementing car sharing programs, such as Zip Car® or City Car Share, and encourage large employers such as the colleges and Hayward Unified School District (HUSD) to implement such programs.	• Dependent upon whether car sharing companies are interested in expanding services to serve Hayward. At this time, local car sharing companies have not expressed significant interest in expanding their services to Hayward, but this may change in the future. • Success of the program is highly dependent on how much marketing and outreach is dedicated to the program.	• Worlds Changing - Tools: Models and Ideas for Building a Bright Green Future - My Other Car is a Bright Green City. • The L.E.K. Consulting Carbon Footprint Report 2007 Carbon Footprints and the Evolution of Brand-Consumer Relationships	**Costs** • Salary for City staff to develop programs, set up a program operations plan, and seed funding for efficiency finance program. Little or no operation costs. • **Additional Benefits** • Decreased commuting and non-commuting trip costs; reduced traffic congestion •

Note: Emissions reductions were not estimated for several actions due to their overlapping effects with other actions and to prevent double-counting

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Action 1.3	Modify City parking ordinances to incentivize walking, biking, and public transit by employing parking strategies that include adding bicycle parking, increasing the number of parking spots with time limits, adjusting parking time limits to correspond with adjacent building uses, increasing the number of paid parking spaces, and making space location and fees consistent with demand targets.	• Parking protocol could have an impact on patronage to local businesses. At the moment, there is a significant concern that revamping parking ordinances could result in damage to local businesses, will likely face opposition, and is better suited for implementation in the future when the economy is more stable. • Costs of a Parking Management Plan and changes to other ordinances may dissuade the City from implementing this action. • Citizens may complain about increase in parking fees and the number of paid parking spaces. • Coordination with adjacent cities may reduce leakage of development and shoppers.	• Refer to City of Hayward CAP, Draft Municipal Code Recommendations, July 24 '08 in Appendix H • Putting on their Parking Caps.pdf Adam Millard-Ball, "Putting on their Parking Caps", Planning, April 2002, v68 i4 p16(6). • Donald Shoup, The High Cost of Free Parking (2005), Planners Press, American Planning Association; Chapter 20 • The San Mateo County Senior Mobility Action Plan, A broad coalition of concerned entities in San Mateo County, www.seniormobilityplan.com	**Costs** • Salary for City staff to rewrite appropriate Municipal Codes; labor and equipment to install and maintain an electronic parking management system. **Additional Benefits** • Reduced traffic congestion, increased parking fee revenues, potential for improved public health from walking and biking.
Improve Effectiveness of Transportation Circulation System				
Action 1.4	Collaborate with BART and AC Transit to explore short- and long-term opportunities to expand services (for example, to extend rapid bus service from Bay Fair to the South Hayward BART Station) and pursue a hydrogen fueling station for both buses and personal vehicle use, improve transit stations by expanding amenities at stations, and improve bus stops by adding benches and shelters.	• These amendments should be incorporated in the next scheduled General Plan and Municipal Code updates and/or the next community transportation plan prepared by the Alameda County Congestion Management Agency. • The reduction in vehicle miles traveled (VMT) possible in the United States ranges between 20 to 40 percent reduction for each increment of new development or redevelopment, depending on the degree to which best practices are adopted. • 7 to 10 percent reduction in total CO_2 emissions by 2050 will accompany such a reduction in VMT compared to continuing sprawl.	• The San Mateo County Senior Mobility Action Plan, A broad coalition of concerned entities in San Mateo County, www.seniormobilityplan.com • UC Davis. Susan Shaheen. Easy Connect II: Integrating Transportation, Information, and Energy Technologies at TOD's, 2005 ITS • North Allston-Brighton Community-Wide Plan, Boston Redevelopment Agency (A TOD plan) • Cervero, Robert, et al. Transit-Oriented Development in the United States: Experience, Challenges, and Prospects. Washington, DC: Transit Cooperative Research Program, Transportation Research Board http://gulliver.trb.org/publications/tcrp • TRB's Transit Cooperative Research Program (TCRP) Report 128: Effects of TOD on Housing, Parking, and Travel, 2004.	**Costs** • Salary for City staff to coordinate with transit agencies. • Cost of design, engineering, labor, and material costs to add or improve transit stations and expand amenities. • Maintenance cost of station and amenities. • Cost to pay staff to operate and staff new shops or proved new services. • Could get funding from increase taxes. • Businesses around stations could benefit from development. **Additional Benefits** • Increase tax from business development around stations.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Action 1.5	Continue to implement and expand the City-wide bicycle master plan through aggressive pursuit of grants and other sources of funding which could be used to expand bike lanes and bike parking facilities. Assist businesses in creating or expanding bike-to-work incentive programs, including bike sharing, adequate secure bike parking, bike maps of the City, bike safety classes, and other incentives that reward bikers.	• Hayward has had a Bicycle Master Plan in place since 1979 and was last updated in 2007. The City has been successful at implementing the programs envisioned in the various iterations of the Plan. The City has already committed resources to implementing the Bike Master Plan, so implementing the Plan to fulfill the CAP recommendation will not require significant additional resources. • When updating the Bike Master Plan, the City should aim to take aggressive actions that will result in significant GHG emissions reductions. The challenge does not lie in updating the Plan; the challenge is updating the Plan with actions that are aggressive enough to allow the City to meet emissions goals. • In order to increase travel on bikes, the City will have to address safety concerns: not only general biker safety concerns, but also neighborhood safety concerns.	• Hayward Bicycle Master Plan – download from www.ci.hayward.ca.us/departments/publicworks/spublicworks.shtm • BAAQMD offers grants for bike facility upgrades through its Bicycle Facility Program. www.baaqmd.gov. • Bay Area Bike Coalition www.bayareabikes.org • Bike Alameda. www.bikealameda.org • California Bicycle Coalition http://www.calbike.org/ • Commuter Benefits Now Extended to Cover Bicyclist, http://blog.wired.com/gadgets/2008/10/bailout-bill-gi.html. • Rails-to-Trails and Bikes Belong. *Active Transportation for America: a Case for Increased Federal Investment in Bicycling and Walking.* www.railstotrails.org/afta. This report quantifies the transportation, energy, climate, public health, and economic benefits of bicycling and walking. • Washington DC has launched the first community-wide bike share program in the United States. https://www.smartbikedc.com • The Bike-sharing World Map shows bike sharing programs throughout the world and provides links to program websites. The Map is provided by The Bike-sharing Blog (http://bike-sharing.blogspot.com) and MetroBike, LLC (http://MetroBike.net).	**Costs** • Salary for City staff to design bike land and bike facilities. • Salary for City staff to pursue grants. • Cost to City for marketing, outreach and education (create bike maps of the City, maintain and expanded bike programs, etc.). • Design and construction cost of bike lanes and bike facilities including secure bike parking. • Cost of maintaining bike facilities. **Additional Benefits** • Reduced traffic congestion. • Improvements in overall air quality which has been linked to public health benefits. • Biking is a low-cost mode of transportation. • Potential for improved public health from exercise benefits of biking.
Action 1.6	Develop and implement a City-wide pedestrian master plan that improves the convenience, safety, and attractiveness of and access to pedestrian ways. Update the plan on a regular basis to ensure that walkability improves over time.	• This will need to take place very soon. The foreclosure crisis is not expected to last for years, and if the City is to pursue this opportunity they will have to act soon. • When developing a plan, the City should aim to take aggressive actions that will result in significant GHG emissions reductions. The challenge does not lie in creating and updating the Plan, the challenge is making the plan aggressive enough to allow the City to meet emissions goals. •	• Walkability metrics: Checklist-walkability.pdf, www.sfphes.org HIA_Tools_PEQI.htm • Greenwald, Michael & Marlon Boarnet, The Built Environment as a Determinant of Walking Behavior: Analyzing Non-Work Pedestrian Travel in Portland, Oregon. Institute of Transportation Studies, University of California, Irvine, July 2001. • Pedestrian Safety Audits: A Pedestrian Safety Guide http://www.walkinginfo.org/library/details.cfm?id=3955 • Bike Walk Twin Cities is an initiative designed to make it easier for people to move about without using a car. Armed with a $21.5 million federal grant, they are building new bike lanes, safer crosswalks, and other improvements to make it easier to walk and bike in Minneapolis and its neighboring communities. Bike Walk Twin Cities is a good model for Hayward www.bikewalktwincities.org	**Costs** • Salary for City staff to develop, implement and periodically update a Citywide pedestrian master plan. • Capital costs associated with implementation. **Additional Benefits** • Reduced traffic congestion. • Improvements in overall air quality which has been linked to public health benefits. • Walking is a low-cost mode of transportation. • Potential for improved public health from exercise benefits of walking.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Action 1.7	Update the City's Circulation Element of the General Plan to locate, evaluate appropriate transit modes such as street car, bus rapid transit, or other modes that eventually decrease the need for personal vehicles for travel within the City. The Plan should integrate pedestrian, bicycles, and transit modes with motor and other vehicles. When proposing changes to the transportation system, the City should consider the climate impacts and give preference to solutions that reduce auto dependency and minimize GHG emissions.	• Plan can be developed and initiated within next 5 years, but it will require a continued effort. • Success of program is dependent on how much marketing and outreach is dedicated to the program. • Implementation will be greatly influenced by oil costs and other driving expenses. • Ease of implementation will depend on regional and State decisions regarding subsidy for this type of program.	• Federal Transit Administration, John L. Renne, Thomas W. Sanchez and Todd Litman. National Study on Carless and Special Needs Evacuation Planning: A Literature Review. http://www.planning.uno.edu/docs/CarlessEvacuationPlanning.pdf • Pedestrian Safety Guide for Transit Agencies, February 2008, FHWA-SA-07-017 • Pedestrian and Transit-Friendly Design: A Primer for Smart Growth, www.epa.gov/dced/pdf/ptfd_primer.pdf	**Costs** • Salary for City staff to develop and periodically update a long-term transportation master plan, and, if required, consulting fees for assistance by transportation planners and engineers. • Other costs include implementation of the plan and construction of improvements. **Additional Benefits** • Motor vehicles cost about 1-8¢ per mile traveled. Many studies underestimate total costs by considering only a portion of total air pollution impacts. The full costs of air pollution, including all types of emissions, and their full impacts on human health (including premature deaths, illnesses, medical care, and reduced physical activity), agriculture productivity, ecological resources, and aesthetic quality leads to relatively high cost estimates.
Action 1.8	Improve traffic flow and reduce vehicle idling by means of synchronized signals, transit and emergency signal priority, and other traffic flow management techniques. When developing the program, Hayward should work with the Metropolitan Transportation Commission and the Alameda County Congestion Management Agency to expand roadway and intersection performance metrics to include pedestrian, bicycle, and level of service criteria to measure quantitative and qualitative metrics such as accessibility, intersection crossing times, and other relevant data. It is recommended that Hayward use evaluation criteria that consider costs and GHG reduction benefits of biking, walking, carpooling, and public transit.	• When developing intelligent transportation systems, the City should be cognizant of ensuring priority access to public safety officials • If successful, intelligent transportation systems will improve driving conditions (i.e. reduce travel time, reduce risk of accidents), which could ultimately encourage people to drive. The City should be aware of this when designing intelligent transportation systems, and make efforts keep VMT down even if driving conditions improve. • Implementing a regional intelligent transportation system will require collaboration with other jurisdictions. It is generally more difficult to manage projects that require a consensus from more than one jurisdiction.	• Improved Methods For Assessing Social, Cultural, And Economic Effects Of Transportation Projects http://www.statewideplanning.org/_resources/234_NCHRP-8-36-66.pdf • National Household Travel Survey, 2001-2002. Bureau of Transportation Statistics (BTS) www.bts.gov/programs/national_household_travel_survey • The Broader Connection between Public Transportation, Energy Conservation. and Greenhouse Gas Reduction. ICF International. www.apta.com/research/info/online/documents/land_use.pdf • Explanation: Intelligent Transportation Systems (ITS), US Department of Transportation. www.its.dot.gov and www.itsoverview.its.dot.gov • The Intelligent Transportation Systems initiative of the US Department of Transportation, Research and Innovative Technology Administration is a useful resource. www.its.dot.gov	**Costs** • Salary for City staff to investigate the changes to transportation, circulation system, consider the resulting climate impacts, and give preference to measures that minimize GHG emissions. • Salary for City staff to work with Metropolitan Transit Commission and Congestion Management Authority. • Clinton Climate Initiative reports that the City of Portland, Oregon invested $533,000 in its traffic signal optimization program. It is estimated that drivers save approximately $4.13 million per year in fuel savings. Source: Clinton Climate Initiative: http://www.c40cities.org/bestpractices/transport/portland_traffic.jsp **Additional Benefits** • Reduced traffic congestion • Reduced travel time • Improved air quality, which has health and environmental benefits.
Utilize Zoning & Land-use Mechanisms to Minimize Need for Transportation				

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Action 1.9	In order to encourage non-automotive modes of travel, continue to implement and update the General Plan Circulation and Land Use Elements pertaining to smart growth principles that support higher-density, mixed-use, and well-designed development in areas within ½ mile of transit stations and ¼ mile of major bus routes. Amend the Municipal Code Zoning, Subdivision, and Off-Street Parking Standards to incorporate smart growth principles, policies, and development standards consistent with recommendations provided in the Appendix H and I of the CAP.	• These amendments should be incorporated in the next scheduled General Plan and Municipal Code updates. • The reduction in vehicle miles traveled (VMT) is possible in the United States ranges between 20 to 40 percent reduction for each increment of new development or redevelopment, depending on the degree to which best practices are adopted. • 7 to 10 percent reduction in total reduction in CO_2 emissions by 2050 will accompany such a reduction in VMT transportation relative to continuing sprawl.	• Rajamani, Jayanthi, et al. Assessing the impact of urban form measures in non-work trip mode, Transportation Research Board 2003 Annual Meeting. Schlossberg, Marc, et al • Urban Land Institute. *Growing Cooler: The Evidence on Urban Development and Climate Change.* 2007. www.1kfriends.com/documents/GrowingCooler9-18-07small.pdf • 2005 and 2008 CNU Transportation Summit Reports: Toward a New Urbanist Transportation Agenda, www.cnu.org • The Pedestrian and Bicycle Information Center (PBIC) is a national clearinghouse for information about health and safety, engineering, advocacy, education, enforcement, access, and mobility for pedestrians (including transit users) and bicyclists. The PBIC serves anyone interested in pedestrian and bicycle issues, including planners, engineers, private citizens, advocates, educators, police enforcement, and the health community. PBIC's websites include – www.walkinginfo.org – www.bicyclinginfo.org – www.pedbikeinfo.org – www.pedbikeimages.org – www.saferoutesinfo.org	**Costs** • Salary for City staff to help promote smart growth land-use planning in City development review, for interim City planning efforts, and for the next General Plan Update. **Additional Benefits** • Reduced traffic congestion, increased transit use, tax revenues and parking fees, potential for improved public health from walking and biking.
Action 1.10	Explore the development of zoning and development standards that consider both the land uses and the urban design and form of buildings and public space, where the new standards will result in reduced GHG emissions.	• Ease of implementation will depend on regional and State decisions regarding development standards. • Costs of creating a form-based code may dissuade the City from implementing this action. • Implementation will be greatly influenced by oil costs and other driving expenses. Form-based codes offer the potential for residents to live closer to daily needs, thus the convenience to drive less. • A decline or displacement of climate change news by economic or political news, for example, will decrease the public's observed need for change in development patterns, thus decreasing the ease of implementation.	• Form-Based Code Institute: Form-based codes create a predictable public realm by controlling physical form, www.formbasedcodes.org • Form Based Codes : A Guide for Planners, Urban Designers, Municipalities, and Developers, Daniel G. Parolek, AIA, Karen Parolek, Paul C. Crawford, FAICP, ISBN: 978-0-470-04985-3 • "Green" Form-Based Codes, a summary of FBC's for sustainability. www.town-green.org • Zoning Reform Has Begun: Form-Based Codes. www.realtor.org/smart_growth.nsf/Pages/formbasedcodes	**Costs** • Salary for City staff to evaluate the development, adoption, and implementation of zoning and development standards that consider both the land uses and the urban design or form of buildings and public space, such as a form-based code, that includes the adoption and implementation estimates. **Additional Benefits** • Potential for decreased design and development costs and time for builders, and reduction in City staff development review time.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Action 1.11	Explore potential strategies related to the creation of additional affordable housing to sell to buyers employed in Hayward but who currently reside in other areas and commute to work in Hayward. For example, consider implementing a community land trust to purchase and resell foreclosed properties. The program could potentially be coordinated with local businesses.	• This will need to take place very soon. The foreclosure crisis is not expected to last for years, and if the City is to pursue this opportunity they will have to act soon. • Ease of implementation will depend on regional and State decisions regarding affordable housing regulations. • A decline in housing prices will have a direct effect on the perceived need for an expanded affordable housing program.	• Congress for the New Urbanism (CNU): CNU Report: Housing Affordability 2008, Ray Gindroz, Daniel Solomon, Emily Talen, John Norquist, CNUhousingreportfinal.pdf • Affordable Housing - CPD – HUD, www.hud.gov/offices/cpd/affordablehousing/index.cfm • Lincon Institute of Land Policy. Community Land Trusts: Leasing Land for Affordable Housing. www.lincolninst.edu • City of Lancaster Neighborhood Stabilization Program http://www.cityoflancasterca.org	**Costs** • Salary for City staff to explore the potential of implementing a community land trust to buy foreclosed properties and sell them to individuals who are employed in and commute to Hayward but reside in other areas, and, if required, consulting fees for assistance by economic advisors. • Cost to City to supply seed funds for purchasing homes **Additional Benefits** • Cost benefits would include increased property and sales tax revenues.
Action 1.12	In order to encourage non-automotive modes of travel, continue to implement and update the General Plan Circulation and Land Use Elements pertaining to smart growth principles that support higher-density, mixed-use, and well-designed development in areas within ½ mile of transit stations and ¼ mile of major bus routes. Amend the Municipal Code Zoning, Subdivision, and Off-Street Parking Standards to incorporate smart growth principles, policies, and development standards consistent with recommendations provided in the Appendix H and I of the CAP.	• Plan can be developed and initiated within next 5 years, but it will require a continued effort. • Success of program is dependent on how much marketing and outreach is dedicated to the program. • Implementation will be greatly influenced by oil costs and other driving expenses. • Ease of implementation will depend on regional and State decisions regarding subsidy for this type of program.	• SMARTRAQ is a Georgia Tech research project whose goal is to provide a framework for assessing which combinations of land use and transportation investment policies have the greatest potential to reduce the level of auto dependence while promoting the economic and environmental health of the Atlanta metropolitan region. www.act-trans.ubc.ca/smartraq/pages • Joint Policy Committee. Bay Area Focused Growth Initiative. www.bayareavision.org • Greenbelt Alliance and Sierra Club Loma Prieta Chapter. *Climate Change in General Plans:* • *Sample Language and Policies for Activists*. March 2009. http://lomaprietaglobalwarming.sierraclub.org/resources/General_Plans_and_Climate_Change-Complete.pdf	**Costs** • Salary for City staff to develop a plan to maximize the number of residents who work within the City. • Costs will vary dependent on the incentives created. **Additional Benefits** • Cost benefits would include increased property and sales tax revenues, and increased business for local shops and services.
Municipal Actions				
Action 1.13	Reinstate commuter benefits such as Commuter Checks to City employees, and when possible expand or develop other commuter benefits programs such as parking cash-out or parking pricing programs, or taking advantage of the new tax credit for biking to work. The City will amend Administrative Rule 2.26 to reflect current transportation demand management opportunities.	• The City will have to advertise the programs and encourage employees to take advantage of the programs. Without proper internal advertising, staff may not take advantage of the commuter benefits programs. • If the City is going to develop or revise its existing commuter benefits programs for City employees, the City may consider developing a resource center for local businesses in conjunction with its internal effort.	• 511.org offers a number of services to Bay Area employers, including government employers, that are developing or improving employee commuter benefits programs. www.511.org • Best Workplaces for Commuters℠ is a membership program that provides qualified employers with national recognition and an elite designation for offering outstanding commuter benefits, such as free or low cost bus passes, strong telework programs, carpooling matching and vanpool subsidies. They also provide best-practice case studies and resources. www.bestworkplaces.org • CommuterChoice.com's mission is to help	**Costs** • Salary for City staff to develop or redesign commuter benefits programs. • Cost to City to pay for commuter benefits programs. • Cost savings to City employees who take advantage of programs. **Additional Benefits** • Could help with employee retention and employee satisfaction.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
			employers connect with service providers in their local areas, who can help implement relevant Commuter Choice programs at their worksites. www.commuterchoice.com • Association of Commuter Transportation supports individual mobility management professionals and organizational members in their efforts to reduce traffic congestion, conserve energy, and improve air quality. www.actweb.org	
Action 1.14	Explore options in developing a car-sharing and/or bike sharing program for City employees. If private organizations like Zip Car are not interested in managing the car sharing program, it could be administered by the City as a benefit available to City employees only. A bike share program would also be administered by the City as a benefit to City employees.	• The City will have to advertise the car share and bike share programs. Without proper internal advertising, staff may not take advantage of the commuter benefits programs. • City may have to address the health and safety risks of providing a bike share and car share program. • City can explore opportunities for public-private partnerships to manage the municipal programs.	• Washington DC has launched the first community-wide bike share program in the United States. https://www.smartbikedc.com • The Bike-sharing World Map shows bike sharing programs throughout the world and provides links to program websites. The Map is provided by The Bike-sharing Blog (http://bike-sharing.blogspot.com) and MetroBike, LLC (http://MetroBike.net). • An international list of cities with car sharing programs is available at http://www.carsharing.net/where.html	**Costs** • Salary for City staff to develop program • Cost to purchase bikes or cars. This cost could be a cost to the City or a private sector entity. **Additional Benefits** • Could help with employee retention and employee satisfaction.
Action 1.15	When making decisions about where to rent or build new City facilities, give preference to locations that are accessible to an existing public transit line.	• It may help to establish a City-wide protocol for renting and/or purchasing buildings in proximity to public transit.	• None identified	**Costs** • Incremental cost to City for purchasing or renting buildings close to transit. **Additional Benefits** • City employees benefit from having an easier commute. • Could help with employee retention and employee satisfaction.

Strategy 2: Transportation: Decrease Carbon-Intensity of Vehicles

Goal

The goal of Strategy 2 is to reduce the carbon-intensity (or amount of GHG emissions released per mile traveled) of vehicles traveling on Hayward's roadways. This will be accomplished by encouraging people to switch to vehicles with higher fuel economy or cleaner-fueled vehicles and by advocating for state and federal programs and policies that would reduce the carbon-intensity of vehicles. This Strategy aims to reduce carbon-intensity of all vehicles that travel in or through Hayward: not just vehicles owned by Hayward's residents or owned by the City government.

Some examples of vehicles with low carbon-intensities include: [68]

- Hybrid vehicles
- Plug-in hybrid vehicles
- All-electric vehicles
- Compressed natural gas vehicles
- Diesel vehicles
- Ethanol-powered vehicles
- Bio-diesel vehicles
- Propane vehicles
- Fuel-cell vehicles
- Ultra-high fuel economy gasoline internal combustion vehicles
-

The long-term goals of Strategy 2 are to (1) increase the average fuel economy of passenger vehicles to 75 mpg by 2050 and (2) increase the average fuel economy of heavy trucks to 11.5 mpg by 2050. As mentioned in Section 4, the CAP did not attempt to evaluate the climate impacts of switching to lower-carbon fuels or transitioning to electric or hybrid vehicles. However, equivalent emissions reductions can be achieved using a number of different vehicle technologies.

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Ease of implementation

Strategy 2 actions could be difficult to implement because Hayward does not have direct control over which vehicles people choose to purchase or the type of vehicles automobile manufacturers choose to build and sell. To successfully implement Strategy 2, Hayward will have to collaborate with nearby jurisdictions, state government, and Federal government. Recent state legislation (SB 375) could make it easier for Hayward to work with other governments and organizations on transpiration-related initiatives.

Strategy 2 actions will result in economic impacts. For example, the federal government and some state governments including California currently are or will provide tax credits for hybrid vehicles. This provides both a purchase incentive and motivation to save petroleum fuel costs. Some additional impacts of specific actions are listed below.

[68] EPA's website Fueleconomy.gov is a useful resource to learn more about passenger vehicles and their carbon impacts.

Note: Emissions reductions were not estimated for several actions due to their overlapping effects with other actions and to prevent double-counting

Purchase of, or conversion to, natural gas vehicles incentives and programs: Natural-gas fueled vehicles may result in cost-savings as compared to gasoline and diesel-powered vehicles. As crude-oil derived fuels (including gasoline and diesel) increase in cost and as natural gas fuel sources become more readily available, natural-gas powered vehicles could become less expensive to operate than traditional vehicles. Implementing programs and policies for natural gas fuel vehicles will be difficult without incentive programs and improved access to the fuel.

Purchase of, or conversion to, lower-carbon-fuel vehicles: Bio-diesel and other alternative-fueled vehicles may save fuel costs over time, as petroleum-based fuels increase in costs, and as alternative fuels become a market commodity. Implementing programs and policies for alternative fuel vehicles will be difficult without incentive programs and especially, increased access, to and reduction in the cost of, alternative fuels.

State and federal collaboration
Hayward does not have the authority to mandate fuel economy or biofuel use. Hayward will depend on the state and federal government to set regulations that direct automobile manufacturers to sell low-carbon vehicles.

Financial disincentives for purchasing high carbon intensity vehicles: Instituting surcharges on vehicle registration fees or other financial or non-financial disincentives to discourage the use of high-carbon intensity vehicles has proven difficult to reenact in California. In general, people are more receptive to financial incentives than financial disincentives. Instituting financial disincentives will be particularly difficult to do in an economic recession.

Estimated GHG Emissions Reductions

If program goals are achieved, it is estimated that Strategy 2 actions will result in an annual emissions savings of approximately 129,060 metric tons CO_2e/year in 2020 and 532,735 metric tons CO_2e/year in 2050, as measured from BAU projections. It is estimated that emissions savings from Strategy 2 will contribute 83.5 percent of the emissions reductions needed to meet the 2020 target and 49.8 percent of the emissions reductions needed to meet the 2050 target (see Appendix C).

Cost and Additional Benefits

Costs

Cost impacts will include cost to the City to pay staff to develop and maintain new programs, to coordinate and collaborate with other governmental agencies and regional planning organizations, and to continue to implement existing programs.

Cost impacts to residents and businesses may include the incremental cost of purchasing lower carbon-intensity vehicles instead of higher carbon-intensity vehicles.

To be successful, residents and businesses will have to participate in efforts to reduce the carbon-intensity of vehicles traveling on local roads. To achieve the level of participation that is necessary to meet aggressive emissions reductions goals, the City will have to pay for ongoing outreach, education, and marketing.

Additional Benefits

Reducing the amount of fuel burned within Hayward will result in decreases in emissions of not only GHGs but a number of hazardous air pollutants including nitrogen oxides, sulfur oxides, ozone, and particulate matter. These hazardous air pollutants cause, among other things, acid rain, smog, and increased asthma rates and other health issues. Reducing fuel consumption could result in health benefits and improved local and regional air quality.

If the fuel economy of vehicles improves while the initial cost of vehicles remains relatively constant, residents could save a significant amount of money from decreased fuel expenditures. It is possible that money residents do not spent on fuel could be spent within the community, thereby improving economic conditions within the City.

Strategy 2 Actions

Community-wide Actions

Action 2.1 Play an active role in collaborating with regional, state, and federal efforts to provide financial and non-financial incentives for residents to purchase low-carbon vehicles. For example, the City could host work sessions with regional transportation planners and policy makers, or the City may support pending legislation. They City could consider granting designated vehicles access to preferred parking spaces.

Action 2.2 Plan an active role in collaborating with regional, state, and federal entities to promote the use of alternative fuels and increased vehicle fuel efficiency standards. For example, Hayward may advocate for higher fuel-economy standards, or contribute to regional and state marketing and outreach efforts.

Municipal Actions

Action 2.3 Continue to procure fuel-efficient and alternative fuel vehicles for municipal vehicle fleet.

Action 2.4 Continue to, whenever possible, negotiate an alternative fuel requirement into new services provided by the City's franchisee.

Summary Table

Table 4: Strategy 2 – Transportation: Decrease Carbon-Intensity of Vehicles

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Community-wide Action				
Action 2.1	Continue to collaborate with regional, state, and federal authorities to provide financial and non-financial incentives for residents to purchase low-carbon vehicles. For example, the City could consider allowing designated vehicles to use preferred or free parking spaces. In future years, the City may also consider instituting disincentives for purchasing high emitting vehicles.	• Ease of implementation will depend on regional and state decisions regarding subsidy for this type of program. • Success of program is dependent on how much marketing and outreach is dedicated to the program. • Implementation will be greatly influenced by oil costs and other driving expenses. • Implementing programs and policies for alternative fuel vehicles will be difficult without incentive programs and especially, increased access to and reduction in the cost of alternative fuels. • Instituting surcharges on vehicle registration fees or other financial or non-financial disincentives has proven easier to enact initially, and much more difficult to reenact or reinstate, at least in California. • There may be a backlash against any program that causes higher fees for residents. This action will require a fiscal analysis to determine the cost/ benefit in order to persuade those affected of its benefit.	• DOE. *Clean Energy Resources Database for Local Governments.* http://cfpub.epa.gov/ceird/index.cfm?fuseaction=local.search_js#category_criteria • Building a Market for Low-Carbon Cars: Lessons from the UK: www.ec.europa.eu/enterprise/automotive/pagesbackground/competitiveness/cars21_hearing/est.pdf • Federal Tax Incentives (United States) | Hybrid Cars, www.hybridcars.com/federal-incentives.html • New Energy Tax Credit for Hybrids www.fueleconomy.gov/Feg/tax_hybrid.shtml • US Senate: "Incentives/disincentives should be put in place..", chris4senate.org/alternativeenergy.html • Climate Institute: Attempts to transform the system by creating disincentives. physics.harvard.edu/~wilson/energypmp/2007_MacCracken-Dingell.pdf • Green Vehicle Guide | US EPA, The US Environmental Protection Agency's Green Vehicle Guide provides vehicle ratings based on emissions and fuel economy, www.epa.gov/greenvehicle	**Costs** • Salary for City staff to create, launch, and maintain non-financial incentives, and/or for staff - with or without fees for consultants - to create, fund, launch, and maintain financial incentives for residents to purchase low-carbon vehicles. **Additional Benefits** • Improved public health as air quality improves. • Job creation from growth in alternative fuels industry.
Action 2.2	Continue to collaborate with regional, state, and federal authorities to promote the use of alternative fuels and increased vehicle fuel efficiency standards.	• Ease of implementation will depend on regional and state decisions regarding subsidy for this type of program. • Operational cost savings accrue with fuel-efficient vehicles, and the expansion of the business of improving the fuel efficiency of vehicles, alternative fuel vehicle conversions, and alternative fuel suppliers all provide economic incentives.	• www.lowcvp.org.uk/about-lowcvp/index.asp • Interested in Hybrid Cars? New Tax Incentives and Benefits, www.environment.about.com/od/greenlivingdesign/a/hybridcars.htm • UK Department for Transport - Low Carbon Vehicle Procurement Policies Nov 7, 2007, www.dft.gov.uk/pgr/scienceresearch/technology/lowcarbonvehicleprocurementprog • Union of Concerned Scientists. http://www.ucsusa.org/clean_vehicles/solutions/cleaner_cars_pickups_and_suvs/clean-car-discount.html	**Costs** • Salary for City staff to continue to collaborate with state and federal authorities to promote alternative fuels and vehicle fuel efficiency standards. **Additional Benefits** • Improved public health as air quality improves; supporting the emerging alternative fuels industry.

Note: Emissions reductions were not estimated for several actions due to their overlapping effects with other actions and to prevent double-counting

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Municipal Actions				
Action 2.3	Continue to procure fuel-efficient and alternative fuel vehicles for municipal vehicle fleet.	• Hayward has already been making efforts to improve the fuel economy of the municipal vehicle fleet. • Many emergency vehicles and public safety vehicles run equipment off of the vehicle battery. City should be aware of this additional load when making purchase decisions. • It is recommended that Hayward track and publish the incremental cost of purchasing advanced vehicles as opposed to traditional vehicles, and track the fuel savings (or emissions savings) from each vehicle purchased. This information can help other fleet owners make informed decisions about transitioning to a lower carbon-intensity fleet.	• Government Fleet has up-to-date information on greening municipal fleets and published best-practices in fleet fuel management. http://www.government-fleet.com/Channel/Fuel-Management.aspx • National League of Cities. Alternative Fuel Programs for Municipal Fleets. http://www.nlc.org/ASSETS/4D4B15DC22EC4B0387E4F503AD9D39E3/CPB%20-%20Alternative%20Fuels%200808.pdf • San Francisco has one of the largest clean-air fleets in the country. Clinton Climate Initiative's reviewed the program and why it is successful can be viewed here: http://www.c40cities.org/bestpractices/transport/sanfran_vehicles.jsp	**Costs** • Incremental cost of purchasing fuel efficient vehicles or alternative-fuel vehicles as opposed to low-efficiency vehicles. • The cost savings from fuel consumption can be significant. San Francisco saves an estimated $150,000 per year in fuel and maintenance costs savings. • BAAQMD offers grants that could help fund Hayward's lower-emission fleet. Programs of particular interest include: (1) Lower-emission School Bus Program, (2) The Transportation Fund for Clean Air, and (3) Carl Moyer Memorial Air Quality Standards Attainment Program. http://www.baaqmd.gov
Action 2.4	Continue to, whenever possible, negotiate an alternative fuel requirement into new services provided by the City's franchisee.	• Fuel efficiency or low-carbon fuel requirements could impact service rates. City should evaluate impact to rate payers. • In the coming years, the City may have the opportunity to purchase biofuels from local sources. The City should, whenever possible, use local fuels to power fleet vehicles provided that the local fuel has lower lifecycle carbon emissions than the traditional fuel. For example, Waste Management now operates a facility at the Altamont Landfill collects landfill gas and converts it to vehicle-grade compressed natural gas. The compressed natural gas produced at the landfill is used to power collection vehicles.	• Government Fleet has up-to-date information on greening municipal fleets including information on negotiating fuel-efficiency with contractors.www.government-fleet.com/Channel/Fuel-Management.aspx • When Hayward re-negotiated its contracts with Waste Management in 2007, the contract included a requirement that Waste Management use alternative fuels to power the fleet used to haul solid waste.	**Costs** • Costs to negotiate use of fuel-efficient vehicles and alternative fuels are not expected to be significant. • Possible that ratepayers could be impacted.

Strategy 3: Energy: Improve Energy Performance of Existing Buildings

Goal

The goal of Strategy 3 is to reduce GHG emissions associated with energy use in existing buildings using regulations, incentives, and educational programs to reduce electricity and natural gas consumption in buildings. The long-term goals of Strategy 3 are to reduce electricity consumption to 65 percent below business-as-usual projections by 2050, and to reduce natural gas consumption to 50 percent below business-as-usual projections by 2050. In its *California Long Term Energy Efficiency Strategic Plan,*[69] CPUC sets goals for reducing energy use in existing buildings. The CPUC goals aim to eventually retrofit existing commercial and residential buildings to achieve zero net energy buildings. The CPUC has the political and legislative power to set state-wide policies and programs to help achieve its goals and having the CPUC on board will help Hayward achieve its own efficiency goals.

Ensuring ordinances are aggressive enough to meet targets

The challenge of implementing the actions presented in Strategy 3 is not with developing energy conservation ordinances or designing an efficiency financing program: the challenge is in making energy conservation goals aggressive enough to result in significant GHG savings. Strategy 3 calls for the development and implementation of Residential and Commercial Energy Conservation Ordinances (RECO and CECO). Typically RECOs and CECOs will focus on the space heating system, hot water heating, lighting, attic insulation, weather-stripping, and replacing inefficient showerheads, toilets, etc. In multifamily buildings and non-residential buildings, RECOs and CECOs would also focus on improving energy use in public areas such as hallways. It is important that when developing the RECO and CECO, Hayward set aggressive goals that will maximize energy savings – and cost savings to residents and businesses.

Perception of energy costs as fixed costs

Another challenge of improving energy performance of existing buildings is that people tend to think of energy costs as a fixed cost that they have very little control over, and that the cost savings from efficiency improvements are rarely large enough to justify investment costs. In reality, energy efficiency can significantly reduce energy expenditures, and though the payback periods of some investments are long, the economics usually make sense when the long-term costs and benefits are considered. To successfully implement Strategy 3, the City will have to help residents and businesses understand and value the long-term cost savings efficiency improvements.

Community support

Community buy-in is especially important for this strategy because to successfully implement Strategy 3 actions, building owners need to make a commitment to energy conservation and energy efficiency. Residents and businesses will have to change consumption behavior and make financial investments in efficiency retrofits. To build community-support, the City may consider implementing Strategy 3 actions in a phased-in approach. A phased-in implementation plan that gradually increases energy conservation requirements will enable residents to become familiar with the program and get a better sense of cost and benefit implications when the stakes are minimal.

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[69] CPCU. *California Long Term Energy Efficiency Strategic Plan.* September 2008. www.californiaenergyefficiency.com

Note: Emissions reductions were not estimated for several actions due to their overlapping effects with other actions and to prevent double-counting

Building upon existing programs

Hayward is already starting to encourage local businesses to embrace energy conservation and energy efficiency. Through a partnership with Pacific Gas and Electric Company (PG&E), the East Bay Energy Watch, KEMA Services, Inc, and the Hayward Chamber of Commerce, the City has been offering free energy audits to local businesses since 2006.[70] Many of Hayward's small and medium-sized businesses have received audits, and over 300 of these businesses voluntarily installed energy-saving equipment after receiving audit results. Hayward could leverage this voluntary program to gather support for a more aggressive program that would require audits and prescribed efficiency improvements. Between 2006 and 2008, the program saved local businesses 7.5 million kWh.

Financing efficiency retrofits

At the time the CAP was written, the financial barriers of efficiency improvements were of particular concern. The nation is facing an economic recession and a major home foreclosure crisis, so taking out new loans for efficiency improvements may not seem attractive to Hayward's citizens and businesses. Other typical financial barriers to improving the efficiency of existing buildings include long paybacks, expensive cost of capital, and split incentives between building owner and building tenants.

The efficiency financing program should be structured to enable building owners to pay for improvements required by the RECO and CECO. There are a number of ways to finance efficiency retrofits. It is recommended that Hayward evaluate the various existing programs and systematically select the financing program best-suited for the social, political, and economic needs of the community. Efficiency improvements are often a pre-requisite for solar financing and Hayward may want to consider requiring some efficiency improvements before offering solar financing.

Split incentives

A split incentive can occur when building owners do not pay the utility bill, so they do not realize the financial benefits of an energy efficiency retrofit and would therefore not be interested in investing in a retrofit. Similarly, if tenants do not pay the utility bill, they are not incentivized to conserve energy and may be opposed to the disturbance of construction during an efficiency retrofit.

Estimated GHG Emissions Reductions

If program goals are achieved, it is estimated that Strategy 3 actions will result in an annual emissions savings of approximately 8,723 metric tons CO_2e/year in 2020 and 205,890 metric tons CO_2e/year in 2050, as measured from BAU projections. It is estimated that emissions savings from Strategy 3 will contribute 5.6 percent of the emissions reductions needed to meet the 2020 target and 19.2 percent of the emissions reductions needed to meet the 2050 target. Estimated annual emissions reductions from specific actions are presented in Appendix B.

Cost and Additional Benefits

Costs

The initial investment costs associated with the actions presented in Strategy 3 include salary for City staff to develop programs and to set up operation plans for continuing the programs. Another cost is the seed funding for an energy efficiency finance program. Depending on how the efficiency financing program is designed, seed money may not come out of the City's budget. It could come from grants, a

[70] Energy Watch. http://www.calenergywatch.com/EastBay.htm

bond, and/or a private financing company. The operational costs of the programs include cost to the City for administering the energy conservation ordinances and the efficiency financing program. The City will also have to pay for community outreach throughout the lifetime of the program.

Strategy 3 actions will result in with some costs to residents and businesses that will be responsible for paying for efficiency upgrades. Residents and businesses that make upgrades will also benefit from the cost savings of lower energy bills.

To be successful, residents and businesses will have to participate in efforts to reduce energy consumption in existing buildings. To achieve the level of participation that is necessary to meet aggressive emissions reductions goals, the City will have to pay for ongoing outreach, education, and marketing.

Additional benefits

Some additional benefits associated with reducing energy consumption in existing buildings include minimizing the risk of energy crises and creating jobs in the energy audit, construction, and efficiency retrofit industries. In addition, building owners will also have the benefit of lower monthly energy bills. These savings can then be re-spent in Hayward's local economy. Other benefits of high-efficiency and green buildings most frequently cited include:[71, 72, 73]

Reduced building operations and maintenance costs

A typical opportunity to reduce operations and maintenance (O & M) costs may occur through the use of more efficient lighting systems, which for example, use lamps and/or other equipment with longer than average lifetimes. These reduce the frequency with which the equipment needs to be replaced, and so also reduce the demands on maintenance staff. This in turn should result in lower overall O & M costs.

Productivity and health benefits

Employees working in green buildings may have improved productivity and may enjoy better health, and therefore, lowered absenteeism. In some studies the value of these benefits are found to greatly outweigh the direct energy savings. These improvements should result in economic benefits to the employer. The benefits however, generally result from a combination of measures. For example, better indoor air quality may be the result of more energy efficient ventilation systems, together with the use of lower volatile organic compound (VOC) emitting construction and furnishing materials.

Improved work place comfort and local energy system controls

Many employees place a very high value on having better thermal control of their immediate workplace surroundings. In fact the most frequent complaints made especially of large office buildings (94%) have to do with air temperature and indoor air quality, and they are the primary reason for tenants moving out.[74] Local thermal controls, like convenient local lighting controls and operable windows are energy efficiency measures as well as measures that provide improvements to occupant comfort.

Other non-energy benefits

Other non-energy benefits of high performance buildings include:

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[71] United States Green Building Council. www.usgbc.org
[72] EPA. Green Buildings. www.epa.gov/greenbuilding/
[73] Flex Your Power http://www.fypower.org/
[74] Lucuik, Mark. 2005. The Business Case for Green Buildings in Canada, Section 4.1 Morrison Hershfield. Ottawa, Ontario, Canada.

- Water savings – especially those measures that result in less water heating demand and in reduced water pumping requirements
- Improved indoor air quality from more sophisticated ventilation systems
- Visual comfort resulting from better daylighting
- Local air quality emissions reductions
- Reduced health problems such as childhood asthma
- Reduced problems of nuclear waste disposal and reactor safety
- Improved electric system reliability
- Contributions to local and national economic growth
- Reduced impacts on energy transportation systems including power line capacity, and road, rail, and sea transportation
- Local job creation [75]
- Extended building lifetimes - better designed and built buildings last longer and therefore have lower long-term costs
- Waste management impacts
- Risk management, liability and loss benefits
- Improved real estate values
- Enhanced public image
- Enhanced employee job satisfaction
- More highly motivated employees
- Reduced climate change impacts
- Carbon trading value
- Reductions in imported energy supplies
- Enhanced global stability and improved national security
- Reduced heat island effects

[75] An evaluation of a federal weatherization program suggested that the program generated 36 direct jobs and 15 supporting jobs for each $1million invested in weatherization. In contrast, each $1million spent on operating a new coal-fired power plan is associated with only 5 jobs – none of them local.

Strategy 3 Actions

Community-wide Actions

Action 3.1	Develop and implement a Residential Energy Conservation Ordinance (RECO) for detached single-family homes which would require improved energy efficiency and energy conservation in residential buildings. Update the RECO on a regular basis to ensure buildings become more energy efficient over time. Typical energy efficiency improvements may include updates to the lighting, heating, ventilation, and air conditioning systems and improvements that lead to water conservation.
Action 3.2	Develop and implement a Residential Energy Conservation Ordinance (RECO) for multiple-unit homes which would require improved energy efficiency and energy conservation in residential buildings. Update the RECO on a regular basis to ensure buildings become more energy efficient over time. Typical energy efficiency improvements may include updates to the lighting, heating, ventilation, and air conditioning systems and improvements that lead to water conservation.
Action 3.3	Develop a Commercial Energy Conservation Ordinance (CECO) which would require improved energy efficiency and energy conservation in commercial buildings. Continuously update the CECO to ensure buildings become more energy efficient over time. Typical energy efficiency improvements may include updates to the lighting, heating, ventilation, and air conditioning systems and improvements that lead to water conservation.
Action 3.4	Actively participate in local low-income weatherization initiatives with the goal of weatherizing all qualifying low-income homes in Hayward.
Action 3.5	Develop public information and education campaign to encourage every household and every business to reduce their energy consumption by 10 percent over ten years.
Action 3.6	Develop a program to encourage or require installation of Home Energy Monitors in existing residences. Home Energy Monitors monitor energy use and provide building occupants with feedback on their real-time and long-term average energy consumption. This may be done in conjunction with Actions 3.1, 3.2, or 3.4.
Action 3.7	Develop a residential energy efficiency retrofit financing program for single unit homes.
Action 3.8	Develop a residential energy efficiency retrofit financing program for multiple unit homes.
Action 3.9	Develop a commercial energy efficiency retrofit financing program.

Municipal Actions

Action 3.10	Take advantage of California Energy Commission's low interest loans for efficiency retrofits and LED street lighting (http://www.energy.ca.gov/efficiency/financing)
Action 3.11	Continue to implement energy conservation practices in City-owned buildings. Prepare an energy conservation plan and update it on a regular basis.
Action 3.12	Improve energy performance of City buildings. Begin by auditing City buildings to identify opportunities for efficiency improvements from both operations and equipment upgrades.

Summary Table

Table 5: Strategy 3 – Energy: Improve Energy Performance of Existing Buildings

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost and Benefits
Community-wide Actions				
Action 3.1	Develop and implement a Residential Energy Conservation Ordinance (RECO) for detached single-family homes which would require improved energy efficiency and energy conservation in residential buildings. Update the RECO on a regular basis to ensure buildings become more energy efficient over time.	• Several Cities including San Francisco and Berkeley have implemented RECOs. These RECOs can provide a model for Hayward's RECO. • A phased-in implementation plan that gradually increases energy conservation requirements will enable residents to become familiar with the program and get a better sense of cost and benefit implications when the stakes are minimal. • If the first phase of a phased-in approach requires energy audits and disclosure of audit results, data collected from the audits will help inform decisions on what efficiency measures may be recommended or required during subsequent phases of the program. For example, if audits results indicate that a number of buildings in the City are under-insulated, the City may consider requiring insulation retrofits at the point of sale. • In its *California Long Term Energy Efficiency Strategic Plan,* CPUC sets goals for reducing energy use in existing homes. The CPUC has the political and legislative power to set state-wide policies and programs to help achieve its goals and having the CPUC on board will help Hayward achieve its own efficiency goals.	• CPUC. *California Long Term Energy Efficiency Strategic Plan.* September 2008. www.California Energy Efficiency.com • DOE. List of tools various government and non-government organizations have developed to help state and local governments develop energy efficiency programs. http://www.epa.gov/cleanenergy/energy-programs/state-and-local/by-topic/efficiency.html • DOE. List of tools and resources for state and local governments on the topic of *Energy and Air Quality Policy Integration* http://www.epa.gov/cleanenergy/energy-programs/state-and-local/by-topic/integration.html • DOE. *Clean Energy Resources Database for Local Governments.* http://cfpub.epa.gov/ceird/index.cfm?fuseaction=local.search_js#category_criteria • Berkeley (http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=14294) • San Francisco Energy Watch (http://www.sfbaywindow.com/articles/1/4/146/1/show.html) • City of Boulder Residential Energy Audit Program http://www.beclimatesmart.com/programs/REAP.php • City of Austin TX (www.austinenergy.com/Energy%20Efficiency/resIndex.htm) • Flex-your-power www.fypower.org • American Council an Energy Efficient Economy www.aceee.org • Clinton Climate Initiative. Best Practice Policies for Energy Efficient Buildings. http://www.c40cities.org/bestpractices/buildings/	**Costs** • Cost to City to pay for staff to develop RECO and CECO. The RECO and CECO programs will likely be implemented in more than one phase. Each phase will require staff time to develop. Depending on the in-house expertise and budget available at the time, Hayward may hire consultant to help develop RECO & CECO. • Cost to City to pay for staff to maintain, implement, and administer RECO and CECO. • Cost to City for education and outreach associated with program • Cost to residents, businesses, and/or building owners to pay for efficiency improvements. **Additional Benefits** • Decreased energy demand will reduce risk of local impacts of future energy crisis. • Decreased energy demand will reduce need for new power plants • Decreased energy consumption will lead to lower energy bills, which is good for both residents and businesses • Efficiency upgrades could create local 'clean-tech', or green jobs. • Savings from improved energy efficiency may be reinvested in other local goods and services.
Action 3.2	Develop and implement a Residential Energy Conservation Ordinance (RECO) for multiple-unit homes which would require improved energy efficiency and energy conservation in residential buildings. Update the RECO on a regular basis to ensure buildings become more energy efficient over time.			
Action 3.3	Develop a Commercial Energy Conservation Ordinance (CECO) which would require improved energy efficiency and energy conservation in commercial buildings. Continuously update the CECO to ensure buildings become more energy efficient over time.	• There has been significant attention to economic development in Hayward, so any proposed CECO must ensure that negative impacts to businesses are minimized. • A phased-in approach where conservation requirements are increased over time would enable businesses to become familiar with the impacts of energy conservation on business revenues. • Through a partnership with PG&E, the East Bay Energy Watch, KEMA Services, Inc, and the Hayward Chamber of Commerce, the City has been offering free energy audits to local businesses since 2006. Many of Hayward's small and medium-businesses have received audits, and over 300 of these businesses voluntarily installed energy-saving equipment after receiving audit results. Hayward could leverage this voluntary program to gather support for a more aggressive program that would require audits and prescribed efficiency improvements. http://www.calenergywatch.com/EastBay.htm		

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost and Benefits
Action 3.4	Participate in local low-income weatherization initiatives with the goal of weatherizing all qualifying low-income homes in Hayward.	• The American Reinvestment and Recovery Act of 2009 (Stimulus Bill) provided $5 billion to the Weatherization Assistance Program. The Program enables low-income families earning less than 200% of the poverty level to permanently reduce their energy bills by making their homes more energy efficient. Each home may receive up to $6,500 in assistance for energy retrofits. Weatherization Assistance Program funding is distributed via formula to States who then divide the money further. • Hayward should consider mechanisms to help qualifying residents in its Jurisdiction to receive ARRA funding. This may involve working with the local Energy Service Provider, local non-profits, or developing City-run education and outreach campaigns to encourage residents to participate in the program. • Hayward should consider ways to leverage ARRA funding to raise more funds for low-income, or income-blind, efficiency retrofits.	• DOE Weatherization Assistance Program Technical Assistance Center http://www.waptac.org • Spectrum Community Services is the Energy Service Provider for the Weatherization Assistance Program in Hayward. www.spectrumcs.org	**Costs** • Federal funding available through DOE. • American Recovery and Reinvestment Act of 2009 allocated $5 billion to DOE's Weatherization Assistance Program • On average, weatherization reduces heating bills by 32% and overall energy bills by about $350 per year. These savings will make a lasting impact for low-income families. **Additional Benefits** • Weatherizing homes could create local 'clean-tech' jobs.
Action 3.5	Develop public information and education campaign to encourage every household and every business to reduce their energy consumption by 10 percent over ten years.	• Will require a significant marketing, outreach, and education campaign. • This action depends on residents and businesses to participate voluntarily. This means that the quantity of emissions savings will depend on how many residents or businesses participate in the voluntary program. This means the success of the program is directly linked to (1) how successful the marketing and outreach campaign is at getting stakeholder to commit to the program, and (2) how successful the City is at helping participants achieve the 10 percent reduction goal. • City may consider partnering with organizations that have expertise in community outreach and capacity to reach a number of people not only in Hayward, but throughout the Bay Area and the Country. Some examples of potential partners would be organizations like the Sierra Club or The Alliance for Climate Protection.	• Burlington Vermont's 10% Challenge: http://www.10percentchallenge.org/ • Minnesota Energy Challenge: http://www.mnenergychallenge.org/ • Lawrence Berkeley National Laboratory's Home Energy Saver software is a useful resource for residents who are interested in reducing their energy use. http://hes.lbl.gov	**Costs** • Cost to City for marketing, outreach, and education • Cost to residents and local businesses to invest in efficiency improvements and/or energy monitoring systems. Energy efficiency financing programs can reduce this impact on businesses. **Additional Benefits** • Savings from improved energy efficiency may be reinvested in other local goods and services. • Efficiency upgrades could create local 'clean-tech' jobs. • Will help build awareness o r energy efficiency among residents and businesses. • Means of engaging community and • Educates and empowers people to change their consumption behaviors.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost and Benefits
Action 3.6	Develop a program to encourage or require installation of Home Energy Monitors in existing residences. Home Energy Monitors monitor energy use and provide building occupants with feedback on their real-time and long-term average energy consumption. This may be done in conjunction with Actions 3.1, 3.2, or 3.4.	• Emissions savings will depend on whether residents that install monitors will change energy consumption behaviors. • City may consider working with PG&E to test emerging technologies that can track real-time energy use and allows utility control over energy demand.	• Lawrence Berkeley National Laboratory's Home Energy Saver software is a useful resource for residents who are interested in reducing their energy use. hes.lbl.gov	**Costs** • Cost to City for marketing, outreach, and education • Cost to residents to purchase and install home energy monitors • Cost savings to residents who reduce energy consumption because of program **Additional Benefits** • Will help build awareness or energy efficiency among residents and businesses. • Means of engaging community, and • Educates and empowers people to change their consumption behaviors.
Action 3.7 Action 3.8 Action 3.9	Develop a residential energy efficiency retrofit financing program for single unit homes. Develop a residential energy efficiency retrofit financing program for multiple unit homes. Develop a commercial energy efficiency retrofit financing program.	• Citizens are typically less excited about efficiency improvements than solar installations. However, efficiency improvements should be required before participating in solar financing programs: California Solar Initiative requires efficiency improvements to qualify for financing. This opens the door for efficiency improvements and makes them more attractive than they would have been without solar. It also lowers the cost of the solar installation to the homeowner if total energy demand is reduced. • Several efficiency financing programs exist, so Hayward will have several templates to work from. • Capital costs are a clear barrier that are preventing both businesses and residents from investing in efficiency improvements. • The American Reinvestment and Recovery Act (Stimulus Bill) authorized the allocation of $2.5 billion of Qualified Energy Conservation Bonds, zero interest bonds, which may be used to issue loans or grants for capital improvements that reduce energy use and where capital costs are recouped over time. • Hayward may consider a program similar to the CityFIRST program that allows property owners to install solar systems and energy efficiency upgrades with no upfront cost. CityFIRST is financed by taxable municipal bonds providing participants with low interest rates, fixed for 20 years. www.renewfund.com	• The Alliance to Save Energy has summarized a number of financing programs (mostly loan funds) for both municipal and private projects www.ase.org/section/topic/financingee • UK is offering free energy monitors: http://news.bbc.co.uk/1/hi/sci/tech/6550361.stm • Database of State Incentives for Renewables and Efficiency (DSIRE) is a comprehensive source of information on state, local, utility, and federal incentives that promote renewable energy and energy efficiency. www.dsireusa.org	**Costs** • Cost to City to pay for staff for financing programs. Depending on the in-house expertise and budget available at the time, Hayward may hire a consultant to help develop program. • If there is enough of an investment opportunity for a private company, the City may be able to contract a private company to design, finance, and operate program. • Cost to City to pay for staff to maintain, implement, and administer RECO and CECO. • Cost to somebody (maybe City, tax-payers, bank, lenders) to finance seed funding for program. • Cost to City for education and outreach associated with program. • Cost to borrowers. **Additional Benefits** • Savings from improved energy efficiency may be reinvested in other local goods and services. • Borrowers can gain access to capital. • Energy savings result in cost savings for building owners. • Efficiency upgrades could create local 'clean-tech' jobs.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost and Benefits
Municipal Actions				
Action 3.10	Take advantage of California Energy Commission's low interest loans for efficiency retrofits and LED street lighting (http://www.energy.ca.gov/efficiency/financing)	• City will have to secure funding for the retrofits. • Hayward can apply for a low interest (as low as 3.95%) loans from the CEC to fund streetlight retrofits.	• The City of Ann Arbor, Michigan has a self-sustaining Municipal Energy Fund that allows the City to continuously invest in energy efficiency improvements. The City started the fund by investing $500,000, and invests in projects with 3-5 year paybacks. By capturing 80 percent of the resulting savings, the fund replenishes and funding is reallocated to new efficiency projects. Information is from the City of Ann Arbor Energy Office: http://www.a2gov.org/government/publicservices/systems_planning/energy/Pages/EnergyFund.aspx. • City of Portland retrofitted 13,300 traffic lights within 3 months. Information on the program can be found here http://www.portlandonline.com/shared/cfm/image.cfm?id=111737	**Costs** • City of Portland, Oregon reported that it cost $2.2 million to retrofit 13,300 traffic signals. City reports saving $265,000 per year on electricity bills. Including reduced maintenance costs, the City saves $400,000 annually because of the program. http://www.portlandonline.com/shared/cfm/image.cfm?id=111737 • Cost savings from reduced energy consumption. • Investment cost of replacing lamps. • Cost savings from reduced energy consumption. • Cost savings from reduced maintenance requirements. LED lamps last longer than sodium vapor lamps. **Additional Benefits** • None identified
Action 3.11	Continue to implement energy conservation practices in City-owned buildings. Prepare an energy conservation plan and update it on a regular basis.	• Energy conservation will require operational changes, which are sometimes difficult to implement. This is especially true for operational practices that are well established. To be successful, the City may need to run an internal education, outreach, and marketing campaign or update internal office protocols. • Hayward may find that its mechanism for tracking energy use is not adequate for capturing energy savings from operational changes or efficiency upgrades. The City may need to re-visit its mechanism for tracking energy use in order to verify that programs are successful.	• Hayward Municipal Code. Article 21. Green Building Requirements for Municipal Buildings. http://www.ci.hayward.ca.us/municipal/HMCWEB/GreenBuildingRequirementsforMunicipalBuildings.pdf	**Costs** • Incremental cost of building energy-efficient green buildings as opposed to non-energy-efficient buildings. • Cost savings from reduced energy consumption. • Cost to prepare energy conservation plan for municipal buildings. **Additional Benefits** • See discussion of "additional benefits" in the discussion on pages 68 and 69.
Action 3.12	Audit all City buildings & identify opportunities for efficiency improvements from both operations and equipment upgrades.	• Local government plays an important role in demonstrating leadership. Efficiency retrofits in public facilities is a highly visible means of showing leadership in energy efficiency – especially if the City showcases efficiency measures in high-traffic buildings and demonstrates that efficiency retrofits are cost effective. • American Resource and Recovery Act funding could be an effective source of funding for efficiency improvements in municipal buildings.	• ABAG Energy Watch is a partnership designed to help local governments implement cost-effective, energy saving projects in public facilities. ABAG Energy Watch is a joint project of Pacific Gas and Electric Company and the Association of Bay Area Governments. Program funding has expired, but Energy Watch will likely remain a useful resource to local governments in the coming years. http://www.abag.ca.gov/abagenergywatch/index.html	**Costs** • Cost to City for conducting audits and making efficiency improvements. • Cost savings from reduced energy consumption resulting from audits. **Additional Benefits** • See discussion of "additional benefits" in the discussion on pages 68 and 69. • Efficiency upgrades could create local 'clean-tech' jobs.

Strategy 4: Energy: Improve Energy Performance of New Buildings

Goal

The goal of Strategy 4 is to minimize GHG emissions associated with new buildings by setting minimum energy and environmental performance standards for all new construction. The specific long-term goals of Strategy 4 include achieving net-zero electricity consumption and reducing natural gas consumption 75 percent below business-as-usual projections in all buildings constructed after 2030. This goal is in line with the United States Green Building Council's 2030 Challenge initiative which asks the global architecture and building community to adopt a target of all new buildings, developments and major renovations constructed after 2030 shall be designed to achieve carbon neutrality (using no fossil fuel GHG emitting energy to operate). The US Conference of Mayors, ICLEI, EPA, and the World Business Council for Sustainable Development are among the organizations that are contributing to and support the 2030 Challenge.[76]

CPUC's *California Long Term Energy Efficiency Strategic Plan* sets more aggressive targets for new residential buildings than both the 2030 challenge and Hayward's goals.[77] The Strategic Plan aims for all new residential construction to be zero net energy by 2020. The Strategic Plan also aims for all new commercial construction to be zero net energy by 2030. Hayward's goals are slightly less aggressive than CPUC's goals because it was determined that Hayward could meet its 2020 and 2050 emissions goal with the slightly less aggressive goals. However, if the CPUC is successful at achieving its goal, and Hayward meets the rest of its goals (as defined in Appendix C), Hayward will overshoot its goal. With the CPUC supporting an effort to achieve zero net energy buildings, it is likely Hayward will achieve its energy conservation and energy efficiency goals. CPUC has the legislative authority and political power to make changes on the state-level to support the shared vision of energy efficient buildings.

Ease of implementation

The Actions in Strategy 4 focus on maintaining the Private Development Green Building Ordinance to ensure that new buildings become more efficient over time. The Ordinance was adopted on November 25, 2008 with support from the community, including from developers.[78] The Ordinance is expected to take effect on August 1, 2009. Before the Ordinance can take effect, an approval from the California Energy Commission (CEC) must be obtained.

By adopting a Private Development Green Building Ordinance, Hayward joined a number of Bay Area Cities, including Berkeley and San Francisco, which have adopted ordinances that require developers to follow industry-accepted green building standards when designing and building new buildings.[79] When the Ordinance takes effect, developers of new residential and commercial buildings will be required to submit documentation verifying that the building has been rated by the GreenPoints Rating [80] system, or

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[76] 2030 Challenge. http://www.architecture2030.org/2030_challenge/index.html

[77] CPUC. *California Long Term Energy Efficiency Strategic Plan.* September 2008. www.californiaenergyefficiency.com

[78] Ordinance added article 22 to chapter 10 of the Hayward Municipal Code and established green building requirements for new private development. The requirements apply, with some noted exceptions, to new construction, additions or remodels over 500 square feet for residential projects, or new construction, additions or remodels entailing 1,000 square feet or more of new or remodeled commercial space.

[79] Bay Area Cities that have adopted green building ordinances include San Francisco and Berkley. StopWaste.org has also developed a series of excellent guidelines and information on green building.
http://www.ci.hayward.ca.us/municipal/HMCWEB/GreenBuildingRequirementsforPrivateDevelopment.pdf

[80] Build It Green's GreenPoint Rated program is used to evaluate the energy and environmental performance of buildings. www.builditgree.org

a similar rating system like LEED.[81] The City will not grant a Certificate of Occupancy without the required documentation.

It is expected that third-party rating systems will update requirements to receive a certification. The requirements for certification will likely remain more stringent than state standards. Because Hayward's Green Building Ordinance requires buildings to perform in accordance to the third-party standards, buildings will have to become more efficient over time without any action from Hayward's policy makers. It is important, however, that Hayward evaluate its Green Building Ordinance regularly to ensure it is as effective as possible.

One challenge to consider when implementing Strategy 4, is that the State will likely increase State-wide energy performance standards (Title 24 standards) so much that State-mandate is more stringent that the local ordinance. AB 32 calls for net-zero energy buildings[82] as a potential target within CAP planning period, which is an indication that aggressive energy performance standards could be forthcoming. If the State comes out with super-aggressive standards, the City may find that a Green Building Ordinance is no longer necessary.

•

The Ordinance is effective and useful given the current State building standards. Hayward could make the Building Ordinances more stringent in the future by requiring:

- New buildings to be built solar ready, meaning that buildings are capable of taking the load of PV and/or solar thermal panels on the roof, and built to accommodate the electrical and plumbing systems necessary to support PV and solar thermal. Eventually, it could be required that all new buildings install solar systems.
- New buildings include the best-available cost effective lighting technologies.
- New buildings include the best-available cost-effective insulation and windows, or meet minimum insulation standards.
- New buildings to be plumbed for grey-water systems.

Estimated GHG Emissions Reductions

If program goals are achieved, it is estimated that Strategy 4 actions will result in an annual emissions savings of approximately 5,472 metric tons CO_2e/year in 2020 and 96,761 metric tons CO_2e/year in 2050, as measured from BAU projections. It is estimated that emissions savings from Strategy 4 will contribute 3.5 percent of the emissions reductions needed to meet the 2020 target and 9.0 percent of the emissions reductions needed to meet the 2050 target (see Appendix B).

Costs and Additional Benefits

Cost

Because the City has already adopted the Private Sector Green Building Ordinance, the investment costs to City government associated with this strategy are minimal. It cost the City approximately $125,000 to develop the Green Building Ordinance. Although each program will be different, this provides a sound estimate of how much it will cost the City to develop other programs that are proposed in the CAP. The

[81] The United States Green Building Council developed the Leadership in Energy and Environmental Design (LEED) Green Building Rating System™ to evaluate the energy and environmental performance of buildings. This third-party certification program is a nationally accepted benchmark for the design, construction and operation of high performance green buildings.

[82] Net-zero buildings are buildings that produce all the energy required to meet energy demand through on-site renewable energy.

operational costs of the program will include paying staff to monitor compliance and to update the ordinance as necessary to ensure buildings become more efficient over time.

This strategy may result in costs to developers if adhering to green building standards is more expensive than not following the standards. Most recent studies have indicated that constructing green buildings may increase construction costs by between 0 and 2 percent. These costs are soon recovered through lower building operating costs especially for energy and water use.[83]

To be successful, residents and businesses will have to participate in efforts to reduce energy consumption in new buildings. To achieve the level of participation that is necessary to meet aggressive emissions reductions goals, the City will have to pay for ongoing outreach, education, and marketing.

Additional benefits

Improving energy performance of new buildings will help minimize the risk of energy crises and will reduce energy bills for building occupants. Third-party rating systems value not only energy savings, but also award other green building principles such as water conservation and use of recycled or low-toxicity materials. Water conservation is an environmental benefit in itself, but it will also result in some emissions savings due to reductions in demand for treated water. Using low toxicity materials in buildings has been linked to health benefits. More benefits of energy efficient buildings are presented in the discussion of Strategy 3.

Strategy 4 Actions

Community-wide Actions

Action 4.1	Continue to implement the Private Development Green Building Ordinance for residential buildings. Evaluate the program on a regular basis to ensure new buildings are getting more efficient over time.
Action 4.2	Continue to implement the Private Development Green Building Ordinance for commercial and industrial buildings. Evaluate the program on a regular basis to ensure new buildings are getting more efficient over time.

Municipal Action

Action 4.3	Continue to implement the Municipal Green Building Ordinance. Evaluate the program every 5 years to ensure buildings are becoming more efficient over time.[84]

[83] A report to the California Sustainable Building Task Force indicated approximate average reductions in energy use of 20 – 40 percent for LEED certified buildings. Gary Katz et. al. *The Costs and Financial Benefits of Green Buildings*. Capital E. 2003.

[84] The City of Hayward has already adopted a Municipal Green Building Ordinance. The Municipal Sector Green Building Ordinance requires newly constructed municipal buildings or building renovations that exceed $5 million in construction costs or 20,000 square feet in area to achieve LEED Silver certification. The City plans on updating the Municipal Green Building Ordinance on a regular basis to ensure new municipal buildings are as energy efficient as possible. The Plan echoes the importance of continuing to update the municipal ordinance.

Summary Table

Table 6: Strategy 4 – Energy: Improve Energy Performance of New Buildings

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Community-wide Actions				
Action 4.1	Continue to implement the Private Development Green Building Ordinance for residential buildings. Evaluate the program on a regular basis to ensure new buildings are getting more efficient over time.	• Hayward adopted a private sector Green Building Ordinance in November 2008 that is expected to take effect in 2009. The City has already addressed the challenges of creating the ordinance. The challenge now is implementing the program. • It is important that when reviewing the Ordinance, the City is mindful that the Ordinance needs to be stringent enough to achieve the aggressive energy efficiency goals. If the Ordinance is not stringent enough, the City will not achieve its long-term GHG emissions targets. • Because the Ordinance is based on a third party rating system that is expected to become more stringent overtime, the City may not have to dedicate too much effort into making the Ordinance more stringent. It would behoove the City if the third party rating systems continue to require more aggressive efficiency measures in order to achieve certification. • City should be cognizant of the cost of efficiency improvements and make efforts to balance costs (to both the City and to residents and businesses) with benefits of reduced energy use. • In its *Long Term Energy Efficiency Strategic Plan,* the California Public Utilities Commission has set a goal that "new construction will reach "zero net energy" (including clean, onsite distributed generation) from all new single and multi-family homes by 2020." With CPUC's shared vision and legislative authority, Hayward's goal of achieving net zero energy buildings is within practical reach. http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf	• CPUC. California *Long Term Energy Efficiency Strategic Plan.* September 2008. www.California Energy Efficiency.com • Hayward's Private Development Green Building Ordinance http://www.ci.hayward.ca.us/municipal/HMCWEB/GreenBuildingRequirementsforPrivateDevelopment.pdf • Attorney General's list of *Local Government Green Building Ordinances in California.* http://ag.ca.gov/globalwarming/pdf/green_building.pdf • United States Green Building Council www.usgbc.org • Build it Green, GreenPoint Rated Program: www.builditgreen.org • Database of State Incentives for Renewables and Efficiency (DSIRE) is a comprehensive source of information on state, local, utility, and federal incentives that promote renewable energy and energy efficiency. www.dsireusa.org • DOE. *Clean Energy Resources Database for Local Governments.* http://cfpub.epa.gov/ceird/index.cfm?fuseaction=local.search_js#category_criteria • 2030 Challenge: http://www.architecture2030.org/2030_challenge/index.html • CPUC. *Long Term Energy Efficiency Strategic Plan* . September 2008. http://www.californiaenergyefficiency.com/docs/EEStrategicPlan.pdf	**Costs** • Costs to City to implement, maintain, and administer green building ordinance. • Cost to City for marketing, outreach, and education. • Cost to developers to finance additional costs of building using green building principles, though most studies indicate that any added construction costs are soon recovered through lower energy and water costs. **Additional Benefits** • Energy saving result in cost savings on energy bills. • Decreased water consumption. • Additional GHG emissions reductions: Green building program results in solid waste reductions, but reductions in waste-related emissions were not calculated for the Climate Action Plan. Green buildings can also earn credit for innovative means of encouraging alternative modes of transportation (i.e. credit for secure bike parking), but CAP does not account for emissions savings from transportation. Some of these savings will be captured through residential green building and the GreenPoint Rated Climate Calculator which estimate these types of emissions reductions. • Higher student and worker productivity in green buildings. • Green buildings often use low-toxicity materials, which likely has associated health benefits.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Action 4.2	Continue to implement the Private Development Green Building Ordinance for commercial and industrial buildings. Evaluate the program on a regular basis to ensure new buildings are getting more efficient over time.			

Municipal Actions				
Action 4.3	Continue to implement the Municipal Green Building Ordinance. Evaluate the program every 5 years to ensure buildings are becoming more efficient over time.[85]	• Ordinance already in place, and City already adhering to the terms of ordinance. This will make implementation relatively easy. • Challenge lies in ensuring that the ordinance is stringent enough to achieve the level of energy savings that will be required to meet the municipal and community-wide targets. • Local government plays an important role in demonstrating leadership. Constructing energy efficient buildings is a highly visible means of showing leadership in energy efficiency – especially if the City showcases municipal buildings to demonstrate the cost effectiveness and livability of efficient buildings.	• Hayward's Municipal Green Building Ordinance. http://www.hayward-ca.gov/municipal/HMCWEB/GreenBuildingRequirementsforMunicipalBuildings.pdf • See resources in Actions 4.1 and 4.2.	**Cost** • Cost to City for incremental cost difference between efficient building and non-efficient buildings. • Cost savings from reduced energy consumption. **Additional Benefits** • Water savings • Increased C& D debris recycling

[85] The City of Hayward has already adopted a Municipal Green Building Ordinance. The Municipal Sector Green Building Ordinance requires newly constructed municipal buildings or building renovations that exceed $5 million in construction costs or 20,000 square feet in area to achieve LEED Silver certification. The City plans on updating the Municipal Green Building Ordinance on a regular basis to ensure new municipal buildings are as energy efficient as possible. The Plan echoes the importance of continuing to update the municipal ordinance.

Strategy 5: Energy: Use Renewable Energy

Goal

The goal of Strategy 5 is to reduce GHG emissions associated with electricity use by increasing the amount of electricity being supplied from renewable sources. The long-term goal is to achieve100 percent of renewable energy generation by 2050. This means that all electricity consumed in Hayward would be generated from renewable sources. Renewable energy would not only help reduce emissions from electricity, but by transitioning natural gas appliances to electricity, it would also help offset emissions from natural gas.

Ease of implementation

Renewable energy economics

The most significant barrier to implementing Strategy 5 actions is cost. Although the cost of renewable energy technologies have historically continued to decrease over time, and current federal and state incentive programs have helped improve the cost-effectiveness of renewable energy, the levelized cost of energy from solar is still typically higher than average retail electricity rates. Placing a price on carbon emissions will help make renewable energy more cost competitive. At the time of writing, the country is beginning a debate on what federal-level carbon legislation will be most effective at reducing emissions. The discussion tends to focus on whether a cap-and-trade system or a carbon tax will be a more effective policy.[86],[87] Regardless of what policy makes it through the house and senate (cap-and-trade, carbon tax, or something different), it is critical that carbon is assigned a monetary value. Further, the value of carbon needs to be set high enough so citizens and businesses make a concerted effort to reduce emissions. When the true value of carbon is realized, renewable energy projects will be cost competitive without state and federal incentive programs. It is recommended that the City of Hayward advocate for a federal carbon policy that aims to help citizens and businesses realize the true value of carbon.

In the absence of a mechanism to value carbon, federal and state incentive programs help address the economic barriers to renewable energy implementation, these incentives have been subject to cycles of expiration and renewal. These cycles have historically caused boom-and-bust cycles in the renewable energy industries. At the time of this writing, state and federal incentive programs are in full swing, so it is an optimal time for the City to implement its own local incentive programs because the overall effectiveness of City programs could be enhanced by combination with the existing state and federal programs. City financing can improve the economic feasibility of renewable energy far more when combined with federal and state incentives, than if the City program was implemented alone without federal and state incentives. At the time the CAP was written, federal tax credits for residential solar were expected to expire in 2016, the same year state-sponsored rebates for solar were expected to expire.[88],[89] The frequent expiration and renewal, and start-and-stop cycles of federal and state programs have created boom-and-bust cycles for the renewable energy industries. City programs should be designed to avoid such pitfalls.

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[86] Yale Environmental 360. *Putting a Price on Carbon: An Emissions Cap or A Tax?*. May 7, 2009. http://e360.yale.edu/content/feature.msp?id=2148

[87] Thomas Friedman. *Showe us the Ball.* New York Times Opposition and Editorial. April 8, 2009. Page A25 of New York edition. http://www.nytimes.com/2009/04/08/opinion/08friedman.html?_r=2

[88] The Emergency Economic Stabilization Act of 2008 extended the federal tax credit for residential solar PV to 2016.

[89] California Solar Initiative. State Wide Trigger Point Tracker. www.csi-trigger.com

Achieving 100 percent renewable energy

To meet its 2050 target, most electricity in Hayward will have to be procured from renewable sources. The City has several options for achieving 100 percent, or near 100 percent, renewable electricity. These options include: using community choice aggregation (CCA) to procure renewable energy for resale to businesses and residents, creating a community-owned utility, advocating for more stringent state-wide renewable portfolio standards (RPS) so that electricity from conventional utilities may contribute toward Hayward's goals, and installing renewable energy on all viable city-owned sites, to power municipal agencies. Any of these programs can be implemented in conjunction with a solar financing program.

Community Choice Aggregation

The CCA program was established by the California legislature in 2002 (AB 117) to give cities and counties the authority to procure electricity in bulk for resale to customers within their jurisdictional boundaries. Unlike traditional utility services, the administrator of the CCA would determine the source of electric supply and the price of electricity generation services. The utility company would still provide electricity delivery services to the end-use customer, and the utility would continue to read the electric meters and issue monthly bills to customers enrolled in the CCA program. Customers would have the choice of being automatically enrolled in the CCA program following a notification process or opting out of the CCA program and keeping regular utility services.[90] The Sustainability Committee considered CCAs at its April and May meetings and decided to monitor progress on the development of CCAs in other jurisdictions, but not to take steps to further study a CCA for Hayward at this time.[91] For more information, see the Committee staff reports on CCAs available at www.hayward-ca.gov/citygov/meetings/csc/ccsc.shtm.

Community-Owned Utility

Hayward has the option of creating a city-owned electricity and natural gas utility. The community-owned utility model empowers communities to have more control over the source from which electricity is generated than it has when purchasing electricity from a private utility such as PG&E. There are over 2,000 community-owned utilities in the United States, so Hayward would have a well established model to follow. The American Public Power Association is a service organization for American public utilities and could be a valuable resource if Hayward chooses to switch to a community-owned utility.[92] The City of Palo Alto could also serve as a model for Hayward. Palo Alto has increased the amount of renewable energy supply by purchasing electricity from wind, solar, landfill gas, and hydroelectric projects. Palo Alto has helped fund its renewable energy procurements by offering a program, PaloAltoGreen, in which rate payers have an option of paying a higher rate for renewable energy. Palo Alto still relies on Western Area Power Administration, which is not as aggressive at producing electricity from renewable sources, to supply the deficit of electricity that Palo Alto's community-owned utility cannot currently supply from its own renewable projects.[93], [94]

Advocating for a State or Federal RPS of 100% by 2050

A more stringent statewide renewable portfolio standard (RPS), or a federal RPS, could contribute to Hayward's progress toward its local renewable energy targets. Currently the statewide RPS is set at 33

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[90] http://www.communitychoice.info/

[91] For more information, see the Committee staff reports on CCAs available at http://www.hayward-ca.gov/citygov/meetings/csc/ccsc.shtm.

[92] American Public Power Association. http://www.appanet.org

[93] City of Palo Alto Utility. http://www.cityofpaloalto.org/depts/utl/default.asp

[94] http://www.City.palo-alto.ca.us/depts/utl/default.asp

percent renewable generation by 2020. If the state increased the RPS to 100 percent renewable generation by 2050, Hayward could meet its own goal of 100 percent renewable generation without altering its current method of purchasing electricity from PG&E. A federal RPS would have the same effect. In addition to setting long-term RPS goal, it is critical that the state or federal government work with utilities to accomplish the goals. Utilities will face a substantial challenge in achieving aggressive RPS goals, and these utilities may need support, both legislative and financial, to a meet the RPS goals.

Because the costs associated with advocating for aggressive state-level or federal RPS standards are relatively low, the CAP recommends that Hayward continue to advocate for more aggressive RPS goals.[95] However, the City should not rely upon the state to adopt a target this stringent, as the political feasibility of such a strong target is greater at the local than the state level. The City should work towards its local renewable energy target independently and in parallel with state-level efforts. The City's progress and leadership actions may serve as a demonstration to the rest of the state.

Renewable Energy Municipal Financing Program

The City should identify the financing method that is best-suited for Hayward's social, political, and economic needs. There are a number of ways to develop a renewable energy financing program, but if the program is not specifically tailored to Hayward's residents, the financing program will not be effective. One program the City may consider is a program like CityFIRST, which allows property owners to install renewable energy systems or make energy efficiency upgrades with no upfront cost then pay back the capital cost through property taxes.[96] The financing program should aim to provide funding for a number of renewable energy technologies including solar water heating, solar electricity generation, and wind energy. The City may consider requiring efficiency improvements as a pre-requisite for building owners to qualify for solar financing. Generally speaking, renewable energy tends to generate more public appeal than energy efficiency, so if Hayward can leverage the appeal of renewable energy to encourage simultaneous investments in efficiency, it will result in even larger emissions reductions.

Political Feasibility of Recommended Strategies

The City is currently exploring the possibility of participating in a regional or state-wide program such as the one being established by the California Statewide Communities Development Authority (or California Communities®) which is a joint powers authority sponsored by the California State Association of Counties and the League of California Cities and whose mission is to provide local governments and private entities access to low-cost, tax-exempt financing for projects that provide a tangible public benefit, contribute to social and economic growth and improve the overall quality of life in local communities throughout California.[97] Another program of interest is the Renewable Fund, which offers a turnkey administration and financing package for renewable energy.[98] The American Reinvestment and Recovery Act of 2009 authorized the allocation of $2.5 billion of Qualified Energy Conservation Bonds, zero interest bonds that may be used to issue loans or grants for capital improvements that reduce energy use and where capital costs are recouped over time. Hayward may

[95] Renewable Portfolio Standards require a specified percentage of electricity generated from renewable sources such as solar, wind, and geothermal.
[96] CityFIRST is the program Berkeley is using to finance renewable energy. CityFIRST is administered by Renewable Fund. www.renewfund.com.
[97] California Statewide Communities Development Authority. www.cacommunities.org
[98] Renewable Fund. www.renewfund.com

consider the using Qualified Energy Conservation Bonds as part of its renewable energy and energy efficiency financing package.

When the City Council Sustainability Committee discussed a solar financing program in December 2008, the group enthusiastically endorsed moving forward with a financing program. Council discussed solar financing programs in a work session in February. The Sustainability Committee's support is an indication that Strategy 5 has political support, and this will facilitate implementation.

Estimated GHG Emissions Reductions

If program goals are achieved, it is estimated that Strategy 5 actions will result in an annual emissions savings of approximately 14,598 metric tons CO_2e/year in 2020 and 80,409 metric tons CO_2e/year in 2050, as measured from BAU projections. It is estimated that emissions savings from Strategy 5 will contribute 9.4% percent of the emissions reductions needed to meet the 2020 target and 7.5 percent of the emissions reductions needed to meet the 2050 target. Estimated annual emissions reductions from specific actions are presented in Appendix B.

Costs and Additional Benefits

Cost

The cost of installing renewable energy systems would be met through the proposed renewable energy financing program.

The cost of advocating for state and federal programs and policies that will increase the amount of renewable energy utilities use to generate electricity as well as the cost of investigating other options for increasing the percentage of renewable electricity provided through the grid would be borne by the City.

To achieve the level of participation on the part of businesses and residents in the renewable energy financing program that is necessary to meet aggressive emissions reductions goals, the City will have to support the cost of ongoing outreach, education, and marketing.

Additional Benefits

Installing more renewable energy will increase the demand for local solar panel venders and installers. This may result in significant job creation for the City. Renewable electricity also displaces electricity from conventional fossil fuel generation, thereby reducing emissions of criteria pollutants such as NO_x (which causes urban smog), SO_x (which causes acid rain) and particulate matter or soot (which is a carcinogen), in addition to reducing greenhouse gas emissions.

Strategy 5 Actions

Community-wide actions

Action 5.1 Develop a program for the financing and installation of renewable energy systems on residential buildings including single and multiple family residential buildings and mobile homes.

Action 5.2 Develop a program for the financing and installation of renewable energy systems on commercial buildings.

Action 5.3 Incorporate a renewable energy requirement into Private Development Green Building Ordinance and the Residential and Commercial Energy Conservation Ordinances.

Action 5.4 Increase the renewable portion of utility electricity generation by advocating for increased state-wide renewable portfolio standards; and consider participating in community choice aggregation, or other means.

Municipal Actions

Action 5.5 Conduct a city-wide renewable energy assessment to estimate the total renewable energy potential and costs and benefits of developing that potential within City bounds. Develop a plan for capturing all cost-effective opportunities.

Action 5.6 Ensure that all new City owned facilities are built with renewable energy (i.e. PV and/or solar hot water) systems as appropriate to their functions.

Summary Table

Table 7: Strategy 5 – Energy: Use Renewable Energy

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost and Benefits
Community-wide Actions				
Action 5.1	Develop a program for the financing and installation of renewable energy systems on residential buildings including single and multiple family residential buildings and mobile homes.	• Model financing methods exist, though many of the programs have been developed for large communities. • Citizens are eager to develop a solar financing program: in drafting the CAP, there were many requests to incorporate a solar financing program. • State and federal financial incentives are available right now. Hayward should take advantage of these incentive programs now. • Financing is a clear barrier that is preventing both businesses and residents from installing solar. The financing program will help address this barrier. • The American Reinvestment and Recovery Act (Stimulus Bill) authorized the allocation of $2.5 billion of Qualified Energy Conservation Bonds, zero interest bonds that may be used to issue loans or grants for capital improvements that reduce energy use and where capital costs are recouped over time. • Hayward may consider a program similar to the CityFIRST program that allows property owners to install solar systems and energy efficiency upgrades with no upfront cost. CityFIRST is financed by taxable municipal bonds providing participants with low interest rates, fixed for 20 years. www.renewfund.com	• Recommendations from Staff to City of Hayward City Council Sustainability Committee January 7, 2009 Agenda and Report. Proposed Solar and Energy Efficiency Financing for Residential and Commercial, and mandatory Solar for New Residential, Commercial Development; and Industrial Development. http://www.hayward-ca.gov/citygov/meetings/csc/ccsc/2009/CSC-CCSC010709.pdf • US DOE Solar America Cities Partnership: www.solaramericacities.energy.gov • GoSolar.org: CEC & CPUC sponsored website for solar financing information applicable to California. http://www.gosolarcalifornia.org • Database of State Incentives for Renewables and Efficiency (DSIRE) is a comprehensive source of information on state, local, utility, and federal incentives that promote renewable energy and energy efficiency. www.dsireusa.org • DOE. *Clean Energy Resources Database for Local Governments.* http://cfpub.epa.gov/ceird/index.cfm?fuseaction=local.search_js#category_criteria • Berkeley FIRST is a solar financing program offered by the City of Berkeley: http://www.ci.berkeley.ca.us/ContentDisplay.aspx?id=26580 , www.renewfund.com	**Costs** • Cost to City to pay for staff to manage financing programs. Depending on the in-house expertise and budget available at the time, Hayward could hire consultant to help develop program. • If there is enough of an investment opportunity for a private company, the City may be able to contract a private company to design, finance, and operate program. • Cost to City to pay for staff to maintain, implement, and administer financing program. • Cost to City, bank, or private lender to finance seed funding for program. • Cost to City for education and outreach associated with program • Cost to borrowers to pay interest on loans, though ideally these costs are covered through the financing program. **Additional Benefits** • Lenders can make money on interest. • Borrowers can gain access to capital. • PV installations may create local 'clean tech' jobs. • May increase value of buildings.
Action 5.2	Develop a program for the financing and installation of renewable energy systems on commercial buildings.			
Action 5.3	Incorporate a renewable energy requirement into Private Development Green Building Ordinance and the Residential and Commercial Energy Conservation Ordinances.	• This action has huge potential for reducing emissions • A number of citizens are excited about Community Choice Aggregation, though this program is relatively new so it would likely require a significant effort to get a program off the ground. • State and federal action may result in increased Renewable Portfolio Standards. Hayward should work with other communities to advocate for state and federal action to increase RPS.	• Local Government Commission – Community Choice Aggregation Implementation Plan http://www.lgc.org/cca/ • CEC Renewable Portfolio Information: http://www.energy.ca.gov/portfolio/ • San Francisco Energy Resource Plan: Choosing San Francisco's Energy Future. www.sfenvironment.org	**Cost** • Cost to the City for advocating for increased renewable portfolio standards very low. • Cost to the City for developing a Community Choice Aggregation program is higher: includes the need to pay staff to work with other communities to develop program, for implementing, maintaining, and administering program. • Most cities interested in CCA program have also contracted a study to evaluate costs and benefits of the CCA program. These costs would be reduced if the study could be for multiple jurisdictions.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost and Benefits
				Additional Benefits • Better air quality if electricity is produced from renewables instead of fossil fuels.
Action 5.4	Increase the renewable portion of utility electricity generation by advocating for increased state-wide renewable portfolio standards; and consider participating in community choice aggregation, or other means.	• It is not likely that a PV requirement will be incorporated into the Green Building Ordinance in the near future. • Initially the requirement could be to build new buildings "solar ready" so that solar systems can be more easily installed later.	• The City of Vancouver, BC requires Pre-piping for Roof-mounted Solar Energy Generation: http://vancouver.ca/commsvcs/cbofficial/greenbuildings/greenhomes/solarenergy.htm • City of Tucson, AZ adopted an ordinance in June 2008 requiring solar ready: http://www.tucsonaz.gov/dsd/What_s_New/GET_READY_FOR_SOLAR.pdf	**Costs** • Cost to City to pay staff to update Green Building Ordinance • Cost to developers to pay for PV in new developments though with financing program, these costs may be covered. **Additional Benefits** • PV installations may create 'clean tech' jobs
Municipal Actions				
Action 5.5	Conduct a city-wide renewable energy assessment to estimate the total renewable energy potential and costs and benefits of developing that potential within City bounds. Develop a plan for capturing all cost-effective opportunities.	• California AB 2466, which was signed into law in September 2008 and became effective in January 1009, allows local governments to produce up to 1 MW of renewable energy on one site within its geographic boundaries and generate offsets that can be used to credit one or more electricity meters within the same geographic boundary. This legislation gives local governments some flexibility in how they can meet renewable generation goals. http://www.leginfo.ca.gov/pub/07-08/bill/asm/ab_2451-2500/ab_2466_bill_20080928_chaptered.pdf	• Energy Watch provides free energy services to Cities. Historically, the program has focused on energy efficiency, but Hayward could encourage the program to expand services to renewable energy. http://www.abag.ca.gov/abagenergywatch/index.html	**Costs** • Cost to City to pay for assessment **Additional Benefits** • Identify opportunities for energy and water savings
Action 5.5	Ensure that all new City owned facilities are built with renewable energy (i.e. PV and/or solar hot water) systems as appropriate to their functions.	• City should be aware of the cost of renewable energy and make efforts to balance costs (to both the City and to residents and businesses) with benefits of reduced GHG emissions from energy use. City may start by establishing a means of determining whether or not a renewable energy project is cost effective. When developing a protocol, City should use metrics like life-cycle costs (instead of simple payback) and should place value (monetary or other) on environmental and health benefits like reduced emissions and improved air quality. • If renewable energy is not cost-effective at the time of construction, new buildings and major retrofits should be designed "renewable-energy ready," or with electrical systems suitable for renewable energy. • Incorporating renewable energy into new buildings and major building retrofits is a highly visible means of showing leadership in renewable energy – especially if the City showcases technologies in high-traffic buildings and educates public on costs and benefits of renewable energy.	• Energy Watch provides free energy services to Cities. Historically, the program has focused on energy efficiency, but Hayward could encourage the program to expand services to renewable energy. http://www.abag.ca.gov/abagenergywatch/index.html	**Costs** • Cost to City to develop ordinance. • Cost to City to pay for PV panels. • Eventual cost savings from reduced energy bills, only after panels are paid back. **Additional Benefits** • Reduced dependency on local utility to provide electricity. • More predictable electricity costs.

Strategy 6: Solid Waste: Increase Waste Reduction and Recycling

Goal

The goal of Strategy 6 is to reduce GHG emissions associated with the disposal of solid waste. The long-term goals are to eliminate emissions associated with waste disposal by 2050. This will be achieved by continuing to implement waste reduction and solid waste diversion programs.

Ease of implementation

The City has a well established recycling program and has recently implemented programs to collect organics from residents and businesses. Implementation of new programs requires evaluation of a variety of complex factors, including the extent of preparation required for the materials collected for recycling, the anticipated diversion levels for the targeted materials and, particularly important, the costs to implement those programs. Hayward residents and businesses have diligently participated in recycling programs and are receptive to new programs The resources provided by Stopwaste.org will continue to be invaluable in the City's efforts to further reduce waste generated and implement viable recycling programs.

Estimated GHG Emissions Reductions

If program goals are achieved, it is estimated that Strategy 6 actions will result in an annual emissions savings of approximately 21,851 metric tons CO_2e/year in 2020 and 68,798 metric tons CO_2e/year in 2050 It is estimated that emissions savings from Strategy 6 will contribute 14.1 percent of the emissions reductions needed to meet the 2020 target and 6.4 percent of the emissions reductions needed to meet the 2050 target . Estimated annual emissions reductions from actions are presented in Appendix B.

Cost and Additional Benefits

Cost

The City's franchisee has contracted with a compost facility outside of Alameda County because no compost facility exists in this County. Many other jurisdictions in Alameda County have also been required to contract with similar facilities located outside this County for the same reason. Costs to implement organics collection programs could be reduced if a compost facility were sited in Alameda County, rather than requiring jurisdictions or franchisees to contract with facilities located at more distant sites, resulting in increased transportation costs. The City has prepared a variety of outreach materials to residents and businesses to promote the recycling services offered and will continue to incur the expenses necessary to do so.

Additional Benefits

As more residents and businesses participate in the recycling and organics collection programs, additional jobs may be created and filled by Hayward residents.

Taking a broader look, recycling will result in GHG savings up-stream from Hayward's landfill. As discussed in Section 4, manufacturing products out of recycled materials requires less energy than manufacturing products from virgin materials. Energy savings from re-manufacturing recycled materials will result in GHG savings that are not accounted for in Hayward's inventory.

Strategy 6 Actions

Community-wide Actions

Action 6.1 Increase participation in the recycling services offered businesses through the City's contract with its franchisee.

Action 6.2 Increase participation in the recycling services offered single-family homes through the City's contract with its franchisee.

Action 6.3 Improve the City's construction and demolition debris recycling ordinance by evaluating other jurisdictions' provisions, as well as the processing capabilities of the various transfer stations and facilities in Alameda County and adjacent counties.

Action 6.4 Evaluate the viability of implementing a ban on certain materials from landfills, e.g., yard trimmings, untreated wood, cardboard, plastic bags, or polystyrene.

Action 6.5 Evaluate the viability of requiring that residents and/or businesses participate in the recycling programs offered through the City's franchisee.

Action 6.6 Develop a program that encourages overall reduction of solid waste in residential and commercial sectors. This would include increasing participation in recycling services at multi-family properties and to eventually make recycling by commercial businesses mandatory.

Action 6.7 Advocate for waste management strategies that aim to maximize the useful value of solid waste by, for example, utilizing landfill gas to create electricity.

Municipal Actions

Action 6.8 Continue to implement recycling programs in City-occupied buildings.

Action 6.9 Implement organics collection programs in City-occupied buildings.

Action 6.10 Develop an Environmentally Friendly Purchasing Policy.

Summary Table

Table 8: Strategy 6 – Solid Waste: Increase Waste Reduction and Recycling

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Community-wide Actions				
Action 6.1	Increase participation in recycling services offered businesses through the City's franchisee	• Will require businesses to be receptive and take an active role in participating in program. • Hayward already has a program developed. It is a lot easier to improve upon an existing program than it is to develop a new program.	• City of Hayward Recycling Services www.hayward-ca.gov • Stopwate.org www.stopwaste.org • Alameda County Green Business Program http://www.greenbiz.ca.gov/ • Zero Waste San Diego www.zerowastesandiego.org • CEC's Zero Waste California program www.zerowaste.ca.gov • California Integrated Waste Management Board www.ciwmb.ca.gov • DOE. *Clean Energy Resources Database for Local Governments.* http://cfpub.epa.gov/ceird/index.cfm?fuseaction=local.search_js#category_criteria • City of Hayward Construction and Demolition Debris Waste Reduction and Recycling Requirements. Chapter 5, Article 10 of Municipal Code. http://www.ci.hayward.ca.us/municipal/HMCWEB/ConstructionandDemolitionDebrisWasteReduction.pdf	**Costs** • Cost to City to provide outreach and technical assistance to businesses to implement programs • Cost to City to finance marketing and outreach associated with program • Cost to businesses to develop and improve recycling programs • To the extent possible, identify funds to contain increases in rates. **Additional Benefits** • May create jobs because of increased demand for collection and waste management services. • Will help City meet diversion goals
Action 6.2	Increase participation in recycling services, particularly food scraps collection, offered residents through the City's franchisee	• Hayward has already developed a residential food scraps collection program. It is easier to improve upon an existing program than it is to develop a new program • To be successful, residents will have to participate in the program.		**Cost** • Cost to City to fund marketing and outreach for program • To the extent possible, identify funds to contain increases in rates. **Additional Benefits** • May create jobs because of increased demand for collection and waste management services. • Will help City meet diversion goals.
Action 6.3	Improve the City's construction and demolition (C&D) debris recycling ordinance by evaluating other jurisdictions' provisions, as well as the processing capabilities of the various transfer stations and facilities in Alameda County and adjacent counties.	• Hayward's existing construction and demolition debris recycling ordinance requires applicants for all construction, demolition, and/or renovation projects valued at $75,000 or more recycle 100 percent of all asphalt and concrete and 50 percent of all other materials generated from the project. • Revising the ordinance requires evaluation of a variety of complex factors, as described, including the relative costs to private contractors. • Businesses may be resistant to more stringent C&D recycling standards. • The C&D Ordinance and the Green Building Ordinance may work well together: one making the other easier to implement.		**Cost** • Cost to City to update C&D ordinance. • Cost to City to implement and maintain existing C&D programs. • Cost to developers for adhering to ordinance. **Additional Benefits** • May create jobs because of increased demand for collection and waste management services. • Will help City meet diversion goals

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Action 6 4	Evaluate the viability of implementing a ban on certain materials from landfill, e.g., yard trimmings, untreated wood, cardboard, plastic bags, or polystyrene.	• Monitoring compliance by residents and businesses will require outreach materials emphasizing the reasons for the ban on the targeted materials. • Implementing bans on materials require obtaining the source of the banned materials and data from the disposal facilities. Banning materials from the landfill does not completely prevent these materials from being discarded at facilities not monitored for compliance.		**Cost** • Cost to City for researching and developing program. • Potential cost to businesses and residents for purchasing more expensive materials as opposed to purchasing materials that are banned. **Additional Benefits** • May create jobs because of increased demand for collection and waste management services. • Will help City meet diversion goals.
Action 6.5	Evaluate the viability of requiring that residents and/or businesses participate in the recycling programs offered through the City's franchisee.	• Ease of implementation will depend on whether residents and businesses support or resist the program.		**Cost** • Cost to City to develop, implement, and maintain program. • Cost to residents and businesses to pay for recycling services. • Cost to recycling companies for expanding services. **Additional Benefits** • May create jobs because of increased demand for collection and waste management services. • Will help City meet diversion goals.
Action 6.6	Develop program that encourages overall reduction of solid waste in residential and commercial sectors. This would include increasing participation in recycling services at multi-family properties and to eventually make recycling by commercial businesses mandatory.	• Would require resident and business participation to succeed.		**Cost** • Cost to City to pay staff to develop program. • Cost to City to pay for marketing and outreach. **Additional Benefits** • May create jobs because of increased demand for collection and waste management services. • Will help City meet diversion goals.
Action 6.7	Advocate for waste management strategies that aim to maximize the useful value of solid waste by, for example, utilizing landfill gas to create electricity. Advocate siting a compost facility in Alameda County in order to reduce costs to transport the materials to more distant facilities for composting.	• Waste management techniques such as gasification and incineration are generally faced with significant opposition. • Waste management facilities, like materials recovery facilities where recyclable materials are recovered from incoming waste, are more expensive to operate than landfills. • Waste Management and Linde will build a liquefied natural gas plant at the Altamont Landfill. Landfill gas will be captured, purified, compressed and used as transportation fuel. At full operation, it is expected that the plant will produce 13,000 gallons of liquefied natural gas per day.	•	**Cost** • Cost to pay City staff to advocate for franchises to use innovative waste management techniques. • Cost to franchises to operate more advanced facilities. • Potential cost to rate payers who are paying for a more expensive waste management facility. **Additional Benefits** • May create jobs because of increased demand for collection and waste management services. • Will help City meet diversion goals.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Municipal Actions				
Action 6.8	Continue to implement recycling programs in City-occupied buildings.	• City has already established a recycling program in municipal buildings and has been successful at getting city staff and visitors to City buildings to participate in recycling efforts. The City collects paper, glass, plastic, and aluminum.	• CIWMB Recycling Website. http://www.ciwmb.ca.gov/Recycle/ • Stopwaste.org's Recycling Links website. http://www.stopwaste.org/home/index.asp?page=525	**Cost** • Cost to City for internal outreach and marketing. **Additional Benefits** • Will help City meet diversion goals. • Will set a good example for the community.
Action 6.9	Implement organics collection programs in City-occupied buildings.	• At the time of writing, the City was exploring a food scraps collection service for municipal buildings. Some of the challenges include staffing and logistics for collection of organic materials. • The City could consider a program for composting paper towels in restrooms.	• Stopwaste.org's Food Scraps Recycling Website. http://stopwaste.org/home/index.asp?page=528 • CIWMB Organic Materials Management Website. http://www.ciwmb.ca.gov/organics/	**Cost** • Cost to City for internal outreach and marketing. **Additional Benefits** • Will help City meet diversion goals. • Will set a good example for the community.
Action 6.10	Develop an Environmentally Friendly Purchasing Policy.	• At the time of writing, the City was exploring an environmentally friendly purchasing policy for municipal purchases.	• Stopwaste.org's Environmentally Preferable Purchasing Website. http://stopwaste.org/home/index.asp?page=372 • Stopwaste.org. *A Resource Guide for Environmentally Preferable Products.* http://stopwaste.org/docs/resource_guide_for_ep_products_3-06.pdf • ABAG. Bay Area Hazardous Waste Committee. Environmentally Preferable Purchasing website. http://www.abag.ca.gov/hazwaste/environmentallypreferablepurchasing.html • EPA's Environmentally Preferable Purchasing program helps the federal government "buy green," and in doing so, uses the federal government's enormous buying power to stimulate market demand for green products and services. http://www.epa.gov/epp/index.htm • The Institute for Local Government Climate Action Network offers a sample Climate Friendly Purcashing Policy: • http://www.coolcalifornia.org/article/buy-green-0	**Cost** • Cost to City for internal outreach and marketing. • Cost to develop protocol. • Incremental cost of purchasing environmentally friendly products. **Additional Benefits** • Will help City meet diversion goals. • Will set a good example for the community..

Strategy 7: Sequester Carbon

Goal

The goal of this strategy is to develop and implant a program that aims to maximize carbon sequestration taking place within Hayward.

Ease of implementation

Promoting urban forestry should be a relatively easy task to complete. One of the challenges of implementing this Strategy is ensuring that tree planting activities — that trees are properly cared for and managed is occurring. If trees are not well managed they will not sequester as much carbon as they could if they were healthy.

Estimated GHG Emissions Reductions

The emissions reductions associated with carbon sequestration are relatively low. Sequestration from trees can range from 35 pounds CO_2e/year (0.02 metric tons CO_2e/year) for small, slow-growing trees to 600 pounds CO_2e/year (0.27 metric tons CO_2e/year) for larger trees growing at their maximum rate.[99] When compared to the annual GHG emissions from one passenger vehicle at about 8,000 lbs CO_2e/year (3.6 metric tons CO_2e/year),[100] it becomes clear that planting trees will make a much smaller contribution to GHG reductions than the other actions presented in the CAP. However, carbon sequestration is important because coupled with an effective education, outreach, and communication plan it can help raise awareness about climate science and encourage individuals to reduce their own emissions.

If program goals are achieved, it is estimated that Strategy 7 actions will result in an annual emissions savings of approximately 284 metric tons CO_2e/year in 2050. Estimated annual emissions reductions from specific actions are presented in Appendix B.

Costs and Additional Benefits

Costs

The investment costs associated with Strategy 7 include developing a carbon sequestration program and developing a protocol for purchasing carbon offsets. Depending on how the sequestration program is designed, Hayward could be responsible for financing some sequestration activities. However, the program could also be designed so developers are responsible for the cost of carbon sequestration on newly developed and re-developed land.

Additional Benefits

The most significant additional benefit of Strategy 7 is raising public awareness about climate change, and encouraging individuals to take action. If the carbon sequestration program creates a significant amount of green space, it could help make the City more livable and appealing for new residents. Planting trees in urban areas can reduce demand for space cooling: strategically placed trees can provide shade and reduce air conditioning demand, but shading can also increase demand for heating in the

[99] California Climate Action Registry. *Urban Forestry Project Reporting Protocol.* Version 1.0. August 2008. www.climateregistry.org.

[100] A passenger vehicle that travels 12,000 miles per year and gets 25 MPG will emit 7970 pounds CO_2e per year

winter. A 1990 study found that California could save about 47,000 GWh over 15 years by planting 50 million trees to shade east and west walls of residential buildings.[101]

Strategy 7 Actions

Community-wide actions

Action 7.1 Develop and implement a program to maximize carbon sequestration activities occurring within Hayward. Activities may include planting trees or managing wetlands.

Municipal Actions

Action 7.2 Develop a protocol for maximizing carbon sequestration on municipal property by way of planning trees or other methods.

[101] US Department of Agriculture. McPherson, E.G.; Simpson, J.R.; Peper, P.J.; Maco, S.E.; Xiao, Q; Hoefer, P.J. 2003. *Northern Mountain and Prairie Community Tree Guide: Benefits, Costs, and Strategic Planting.* Albany, CA. Forest Service, Pacific Southwest Research Station.

Summary Table

Table 9: Strategy 7 – Sequester Carbon

Action #	Description	Notes on implementation	Model Programs & References	Notes on Costs and Benefits
Community-wide Actions				
Action 7.1	Develop and implement a program to maximize carbon sequestration activities occurring within Hayward. Activities may include planting trees or managing wetlands.	• Shade from trees reduces energy used for cooling, but the shade can also interfere with the effectiveness of solar systems. City will have to weigh the options between planting trees and installing solar. • City should consider not only the cost of planting trees, but also the costs associated with maintaining trees. Unhealthy trees will not sequester as much carbon as healthy trees.	• Winter 2008 newsletter of the Center for Urban Forest Research: www.fs.fed.us/psw/programs/cufr/products/12/psw_cufr755_winter2008newsbrief.pdf • US Forest Service's Climate Change Resource Center: www.fs.fed.us/ccrc/ • CCAR. *Urban Forest Project Reporting Protocol.* http://www.fs.fed.us/ccrc/topics/urban-forests/docs/Urban%20Forest%20Protocol%20081208.pdf • Cooperative Research Centre for Greenhouse Accounting. *The Tree Carbon Calculator.* http://svc237.bne113v.server-web.com/calculators/treecarbon.htm	**Costs** • Cost to City to develop carbon sequestration plan. • Cost to City to pay for initial tree planting. • Cost to City to care for and maintain trees. • NCDC Imaging www.ncdcimaging.com/ can provide tree canopy surveys and carbon storage analysis via remote sensing technology. A rough estimate from a representative indicated that Hayward could spend $25K to $50K on such a survey. **Additional Benefits** • Strategically placed trees can provide shading and reduce air conditioning demand. • Green spaces can help communities thrive.
Municipal Actions				
Action 7.2	Develop a protocol for maximizing carbon sequestration on municipal property by way of planning trees or other methods.	• At the time this CAP was prepared, the City was in the process of applying for a grant from the California Department of Forestry and Fire Protection to fund a tree inventory of publicly maintained and protected trees within the City of Hayward. An up-to-date inventory will help with tracking carbon sequestration.	• CCAR. *Urban Forest Project Reporting Protocol.* http://www.fs.fed.us/ccrc/topics/urban-forests/docs/Urban%20Forest%20Protocol%20081208.pdf • Cooperative Research Centre for Greenhouse Accounting. *The Tree Carbon Calculator.* http://svc237.bne113v.server-web.com/calculators/treecarbon.htm	**Costs** • Cost for planting trees. • Cost for continued tree maintenance. **Additional Benefits** • Green space can help communities thrive. • Additional energy savings if trees create shading in the summer.

Strategy 8: Climate Change Adaptation

The three member agencies of the Hayward Area Shoreline Planning Agency (City of Hayward, Hayward Area Recreation and Park District and the East Bay Regional Park District) have contracted with a consultant to prepare a Sea Level Rise Study. The study will evaluate the potential impacts of sea level rise on the Hayward shoreline and the feasibility of making improvements to prevent or mitigate potential flooding. During the preparation of the final version of the CAP, the Sea Level Rise Study had not been completed. A summary of the study will be included here when the CAP is updated.

Strategy 9: Engage and Educate Community

Goal

To meet aggressive GHG targets, it is imperative that individuals and businesses do what they can to reduce their own emissions. Hayward is relying on its constituents to be committed and engaged in efforts to reduce emissions. As outlined in the CAP, Hayward plans on developing policies and programs that will make it easier for people to minimize the amount of GHGs they emit, but these programs will only be successful if the community is receptive to new ideas and willing to change their behaviors. The successful implementation of each action presented in Strategies 1 through 8 depends on community participation. Because community participation is such a vital component of successful implementation, the CAP proposes specific actions that aim to maximize community participation.

The goal of Strategy 9 is to maximize community participation efforts to reduce emissions and continue harnessing residents' sense of commitment to environmental responsibility. This will be achieved by developing and implementing comprehensive education, outreach, and marketing programs. The City proposes to focus on improving access to information on energy and climate-related issues, and on improved communication between government, residents, and businesses.

Ease of implementation

Reducing emissions and achieving GHG targets will only be possible if the community is successfully engaged. Local government can institute policies and programs that make it easier for individuals and businesses to reduce emissions, but programs are only as effective as the community's commitment to reducing emissions.

Some of the challenges of effective public engagement include:

- Establishing and maintaining communication – generally speaking, people are more receptive to communication if they are engaged in an environment where they feel comfortable (school, places of worship, work, or social centers).
- Sending a clear and concise message – with so much information available about climate change, it can be difficult for people to discern what they should do to reduce emissions. It is important for the City to provide constituents with a consistent and clear message.
- Calling for action – when asking stakeholders to take action, it is important to spell out exactly what the City is asking and explain how this action will benefit the community and individuals.
- Concerns about cost – many residents may be concerned about the cost of reducing emissions, and may not participate in programs because of this fear. The City can address this by providing information on the costs of participating in specific programs, the financing opportunities available, and the cost savings associated with reduced energy use.
- Leadership by example – residents will likely be more receptive to make changes if they see prominent people in the community making changes. These prominent people may include elected officials, teachers, members of local boards and committees, heads of churches or other places of worship. Hayward may choose to make a concerted effort to encourage these prominent people to adopt climate-friendly practices early, and to be open with the community about their commitment to the climate. Another way Hayward can show leadership is by working to reduce emissions from government operations.
- Empowering people to make informed decisions – the decision to reduce personal emissions is not a trivial decision. People who make this decision will want to know what they will have

to do to reduce emissions, if efforts will change their regular schedule or routine, how much it will cost, and what resources are available. Because many people will want to do some research before making the decision, it is important that Hayward do what it can to make information accessible to residents.

It is recommended that Hayward use its existing resources to reach, engage, and educate the community. For example, the City could work with local universities (California State East Bay and Chabot College), non-profit organizations, the Hayward Chamber of Commerce, or the Keep Hayward Clean and Green Taskforce. Partnering with the private sector will enable the City to leverage staff efforts and will lead to a more effective education and outreach program. One idea that came out of the public comment period was to work with the universities and/or high schools to develop a multi-media curriculum, a set of lesson plans, or a day-long field trip, for younger children to learn about the local impact of climate change and ideas on how students and their families could reduce emissions. A program like this would encourage collaboration between the high schools and the universities and take pressure off of primary school teachers to develop lessons on climate change.

During the public comment period on the Draft CAP, a number of people recommended that Hayward demonstrate energy efficiency and renewable energy programs in highly visible and strategically placed "landmark" projects. The City could choose a number of ways to fulfill the request for highly visible landmark project. For example, the City may decide to focus its household energy efficiency retrofit efforts on one specific neighborhood to generate interest in the program and demonstrate the effectiveness of reducing energy use on a community scale. The City could also choose to retrofit several buildings (strategically place in various neighborhoods), and open these buildings up for public tours and tours for schools children. It is also recommended that the City retrofit all municipal buildings and make the costs and benefits of the energy retrofits available to the public.

Estimated GHG Emissions Reductions

The effects of community education and participation are difficult to quantify due to the large number of variables, and so may require a more qualitative than quantitative assessment. Without adequate community participation, however, Hayward can expect to see fewer emissions reductions. Simply stated, change "... is more likely to be successful and permanent when the people it affects are involved in initiating and promoting it."[102] In other words, a crucial element of community engagement is participation by the individuals, community-based organizations, and institutions that will be affected by the effort.

Cost and Additional Benefits

Costs

The cost impacts of implementing the actions proposed in Strategy 9 will consist of significant City staff time to develop and execute new communication, outreach, and education plans, and developing promotional and education tools. The costs associated with community engagement will be ongoing. Every time the City develops new programs or updates an existing program there will be costs associated with marketing, outreach, and education. Professional educators in public and private institutions may assist as volunteers and/or incorporate programs into their own curricula.

[102] Thompson B, Kinne S. *Social change theory: applications to community health*. In: Bracht N, (editor). Health promotion at the community level. Newbury Park (CA): Sage Publications; 1990.

Additional Benefits

If Hayward develops a comprehensive program to engage residents and local businesses in an effort to reduce emissions, the program could help the City communicate about climate-related issues but also communicate to constituents about initiatives outside of the CAP efforts. Hayward could piggyback on the CAP effort to engage the community to improve overall communication between government and the community.

If Hayward is successful at encouraging lasting changes in the way residents and businesses consume energy and fuel and generate solid waste, the City may see unexpected changes to the economy and to lifestyle. For example, residents who drive less may feel more connected with their neighborhoods. People will also be saving more from lower energy and fuel bills so they will have more money to spend in other areas of the economy. If Hayward successfully implements the CAP according to the proposed timeframe, the total cost savings from reduced fuel and energy consumption is estimated to be $32.7 million.[103] The economic analysis prepared for the AB 32 Scoping Plan economy would grow very slightly as a result of activities aimed at reducing emissions when compared to the business-as-usual case.[104]

Strategy 9 Actions

Community-wide Actions

Action 9.1	Create a stand-alone Green Portal, or website, that would serve as the City's hub for all things green. The site would contain a dedicated area for green building, all programs related to the climate action plan, and information about local green jobs and training. The portal will ensure that all residents and businesses have access to information on the City's climate-related initiatives.
Action 9.2	Develop and implement a plan that aims to engage residents in the City-wide effort to reduce emissions. The plan will be designed to reach residents of all ages, races, and classes on how to reduce GHG emissions and will introduce residents to City climate action programs. This plan will incorporate a long-term plan to involve K-12 schools and universities and utilize the most effective means of engaging the broader community.
Action 9.3	Develop and implement an outreach plan to engage local businesses in climate-related programs. This program should provide a benefit for both local government and businesses: the City will aim to provide businesses with information on local, state, and federal programs, and businesses should be given the opportunity to provide input on ways local government could help streamline their efforts to reduce emissions. In developing this plan, the City will explore options for engaging the Chamber of Commerce, the Keep Hayward Clean and Green Taskforce, the Alameda County Green Business Program, and other business councils.

[103] 11,426,719 gallons gasoline of fuel savings x $2.5/gallon + 570,597 gallons diesel x $3/gallon diesel + 15,604 MWh electricity savings x $120/MWh + 572,990 therms x $1/therm = $ 32.7 million

[104] AB 32 Scoping Plan reports an expected 2.8% increase in gross state product, a 2.8% increase in personal income, and a 0.9% increase in employment when comparing the business-as-usual case to the case where actions presented in the Scoping Plan are implemented.

Municipal Action

Action 9.4	Offer a GHG reductions education program in which employees will learn about programs the City already offers, and/or will offer in the future to residents and businesses.
Action 9.5	Show leadership by setting targets to reduce municipal emissions and work diligently to meet targets.
Action 9.6	When awarding contracts, professional service agreements, grants, etc. to businesses or non-profit agencies, the City will request proposals or applications to include information about the sustainability practices of the organization.

Summary Table

Table 10: Strategy 9 – Engage and Educate Community

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
Community Actions				
Action 9.1	Create a stand-alone Green Portal, or website, that would serve as the City's hub for all things green. The site would contain a dedicated area for green building, all programs related to the climate action plan, and information about local green jobs and training. The portal will ensure that all residents and businesses have access to information on the City's climate-related initiatives.	• Web access that is easy to find, simple to understand, and hierarchical to allow access to several layers of information will improve support for the plan. • Success of the program is dependent on how much marketing and outreach is dedicated to supporting the program. • Cost of creating and hosting a website for residents and businesses to access this information may delay implementation of this action. • The website can include information about the City's progress toward meeting the CAP targets.	• Example websites www.beclimatesmart.com/ www.greenmartinez.org • Communicating about Climate Change: Challenges and Opportunities, Brownlash Communication about Climate Change: An Analysis of Recent Publications, www.fes.uwaterloo.ca/research/climateconference/ • Climate Change Action Plans: Sustainability: City of Vancouver. To reduce community green house gas emissions (GHG's), www.vancouver.ca/sustainability/climate_protection.htm	**Costs** • City staff and/or consultants costs for website design, hosting, and maintenance to create a stand-alone Green Portal. • City and other labor and material costs of creating and distributing this information in digital and hard copy to ensure that residents and businesses have access information on the City's climate-related initiatives. **Additional Benefits** • The Portal will serve as a clearinghouse and information resource for the CAP, and a venue for enabling interactive citizen participation. • Good communications access will attract interest and support for the CAP, and enable citizens to participate in the process.
Action 9.2	Develop and implement a plan that aims to engage residents in the City-wide effort to reduce emissions. The plan will be designed to reach residents of all ages, races, and classes on how to reduce GHG emissions and will introduce residents to City climate action programs. This plan will incorporate a long-term plan to involve K-12 schools and universities and utilize the most effective means of engaging the broader community.	• Education on the benefits of reduced emissions will increase the effectiveness and continued support for this effort. Without this, the plan could lack the support it needs to survive any changes in local opinion. • Without continued support by the City, the plan will be difficult to implement on an ongoing basis. The City must continue to support and realize the importance of outreach to enable this action to survive any local political change. • Costs of this outreach may dissuade the City from implementing this action. • The ease of helping citizens understand the value and implications of the proposed CAP strategies will be directly related to reporting and promotion of emission-related regulations, further evidence of the impacts of climate change, and the cost savings in conservation and building energy and fuel efficiency. • Ease of implementation will depend on regional and state decisions regarding subsidy for this type of program. • Success is dependent on how much marketing and outreach is dedicated to the program.	• Talk of the City: engaging urbanites on climate change, www.iop.org/EJ/article/1748-9326/1/1/014006/erl6_1_014006.html • Engaging residents. What we are looking for. Graeme Bennett. 20 November 2008 www.encams.org/events/downloads/Graeme_Bennett_Audit_Commission.pdf • Climate Change - Public Involvement Climate Change and related issues for the State of Utah. www.deq.utah.gov/Climate_Change/public_involvement.htm • Supporting Effective Participation in the Climate Change Debate, www.sustainer.org/pubs/siclimate.PDF • National Charrette Institute (NCI) Trainings and Certificate Program: Sustainable community and building design, and building design www.charretteinstitute.org/programs.html • Lesson Plans Global Warming: Earth Science, Physical Sciences ... K-12 School Lesson Plans, Curriculum and Materials, www.climatechangeeducation.org • BAAQMD has produced a curriculum targeted at 4th and 5th graders called *Protect Your Climate* http://www.baaqmd.gov/pln/documents/climatechange.htm#GrantProg	**Costs** • Costs for City staff and/or consultants to develop and implement a plan that aims to engage residents in the citywide effort to reduce emissions. **Additional Benefits** • The plan will provide a comprehensive educational venue to reach people where they can learn and participate. • Hayward citizens will benefit from individual and collective efforts to reduce GHG emissions in terms of personal and environmental health, cost savings, and greater awareness of the causes and effects of, and remedies to climate change.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
			• ICLEI Outreach and Communications Guidebook: http://www.icleiusa.org/action-center/engaging-your-community/outreach-and-communications-guide • Behavior Matters! The Design, Implementation and Evaluation of Energy Efficiency Programs to Reduce Greenhouse Gas Emissions. A presentation by Edward Vine http://www.arb.ca.gov/research/seminars/vine/vine.pdf	
Action 9.3	Develop and implement an outreach plan to engage local businesses in climate-related programs. This program should provide a benefit for both local government and businesses: the City will aim to provide businesses with information on local, state, and federal programs, and businesses should be given the opportunity to provide input on ways local government could help streamline their efforts to reduce emissions. In developing this plan, the City will explore options for engaging the Chamber of Commerce, the Keep Hayward Clean and Green Taskforce, the Alameda County Green Business Program, and other business councils.	• Education on the benefits from reduced emissions will increase the effectiveness of the implementation and continued support of this effort. • Without continued support by the City, the plan will be difficult to implement on an ongoing basis. The City must continue to support and realize the importance of outreach to enable this action to survive any local political change. • Costs of this outreach may dissuade the City from implementing this action. • Success of program is dependent on how much marketing and outreach is dedicated to the program. • Business will have an incentive to evaluate the costs and benefits of each proposed action that impacts their business. • Ease of implementation will depend on regional and state decisions regarding available funding for this type of program. • Success of program is dependent on how much marketing and outreach is dedicated to the program.	• How to Communicate Climate Change: The business challenge, bis.lucita.org/node/2084 • International Business and Global Climate Change: Nov 14, 2008 www.routledgebusiness.com/books/International-Business-and-Global-Climate-Change-isbn9780415415538 • Sustainability and Climate Change - Community ., Engaging Local Communities www.tq.com.au/resource-centre/sustainability-and-climate-change/ community-engagement/community-engagement • Public Involvement Techniques for Business and Transportation Decision-making. www.mongabay.com/reference/environment/Public_involvement.html	**Costs** • The salary for City staff and/or consultants to develop and implement a plan to engage local businesses in climate-related programs. **Additional Benefits** • Businesses will learn how, where, when, and why to support and participate in CAP actions. • Increase local business awareness of the economic value in supporting the CAP
Municipal Actions				
Action 9.4	Offer a GHG reductions education program in which employees will learn about programs the City already offers, and/or will offer in the future to residents and businesses.	• Program could fit into City's existing internal education practices. • Success of program is dependent on whether employees take advantage of programs.	• None identified	**Costs** • Cost for internal outreach, marketing, and education program **Additional Benefits** • None identified
Action 9.5	Show leadership by setting targets to reduce municipal emissions and work diligently to meet targets.	• This CAP identifies an emissions reduction target and a number of actions the City can take to meet the target.	• None identified	**Costs** • Cost to City to develop and implement programs. **Additional Benefits** • None identified
Action 9.6	When awarding contracts, professional service agreements, grants, etc. to businesses or non-	• Hayward negotiated a clean fuels agreement with Waste Management during the last contract negotiation. City can use this negation as a	• None identified	**Costs** • Cost to City to develop protocol.

Action #	Description	Notes on implementation	Model Programs & References	Notes on Cost
	profit agencies, the City will request proposals or applications to include information about the sustainability practices of the organization.	template for future negotiations.		**Additional Benefits** • None identified

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Section 6 – Implementing the Plan

Section 6 focuses on mechanisms and approaches Hayward can use when implementing the Climate Action Plan. The Section begins with a discussion about managing City staff resources, and then discusses factors to consider when deciding which actions to prioritize. The Section concludes with ideas about mapping out a budget for climate programs and matching the budget with funding sources. It is important to note that, given the scope of the CAP, details for many of the actions identified remain to be resolved. The actions identified call for bold action, some of which will require significant staff analysis, public input, and further consideration by the City Council to ensure financial feasibility.

Managing City Staff Resources

Recommendations:

1. The City establish a Climate Action Management Team to support and guide efforts to reduce emissions.
2. The City appoint a permanent Sustainability Coordinator who will coordinate the Climate Action Management Team, develop and implement programs/actions, and be responsible for monitoring and reporting on progress toward meeting the long-term emissions reductions goals.
3. The City develop a protocol for annual reporting on progress towards meeting emissions targets. Reporting should be rigorous enough to provide an accurate analysis, but should not be so demanding that it takes away from efforts to reduce emissions.

Successful implementation of the Plan will require participation and support from the community and multiple City departments. Meeting the aggressive emissions reductions targets will require a team of key participants to come together with a unified vision and a collective motivation to achieve emissions reductions.

Climate Action Management Team

The Climate Action Management Team (CAM Team) will work in collaboration with residents and members of the business community to develop programs that can effectively reduce emissions while also minimizing adverse effects to the community at large. During the planning stage, the CAM Team can help identify potential barriers to implementation, and ensure that these barriers are addressed early before they hinder emissions reductions. The CAM Team can also help make implementation as straightforward as possible. Key requirements for success include:

- A clearly defined long-term vision and direction
- Strong political support from the City's top decision makers
- Identifiable climate program champions at all levels (i.e. including decision makers, management, and staff) of all relevant departments
- Strong community support

Key participants may vary depending on current project priorities, but are likely to include representatives from the following departments, commissions, committees, and community groups:

- **Finance Department** – provides assistance on budgetary, accounting, and economic analysis of climate projects and assists in securing long-term financing for the climate action program.
- **Public Works Department** – provides expertise on transportation, energy, and solid-waste-related issues. Also provides leadership on how to minimize energy consumption, fuel use, and solid waste generated within City operations.
- **Development Services Department** – evaluates development proposals for compliance with climate action goals and policies and offers expertise in long-term planning.
- **City Manager's Office (Economic Development)** – provides assistance on evaluating and managing the economic impacts of climate action programs.
- **Maintenance Services Department** – provides insight into how the City may improve conditions for walkers and bikers, and provides experience for landscaping and tree-planting programs that will reduce emissions and also enhance the walking and biking experience.
- **Library and Neighborhood Services Department** – provides expertise in communicating with the community about climate-related programs and services.

Other team members may be added on a project-specific basis to provide specialist skills: legal, human resources, purchasing and contracts, technology, etc.

The City should also consider inviting representatives from the Hayward Chamber of Commerce and Hayward's various committees and commissions to serve on the CAM Team and provide guidance and support on specific projects and programs. Some of the obvious relevant committees and commissions include:

- Keep Hayward Clean and Green Task Force
- Economic Development Committee
- Planning Commission
- Hayward Redevelopment Area Committee

There are also local non-profit energy interest groups and community leaders who, while perhaps not permanent CAM Team members, can also be valuable supporters of local emissions-reductions efforts. Other possible community supporters include local environmental organizations, including those concerned with the relationships between emissions and human health. For example, childhood asthma is of growing concern, and has been strongly linked to local air quality, which is in turn directly impacted by local climate policies. California State University, East Bay is another obvious resource the CAM Team could consider utilizing.

Sustainability Coordinator

The CAM Team will be comprised of members of the public and individuals that work in various City departments and they will inevitably have responsibilities outside of the CAM Team. To ensure the CAM Team has access to dedicated staff resources, it is critical that there is at least one staff member whose primary job description includes coordinating the CAM Team. This Sustainability Coordinator can also be responsible for monitoring and reporting on progress towards meeting emissions targets; specific climate-related responsibilities should be written into that staff member's primary job description. Key job requirements include:

- Recruiting members to the CAM Team.

- Ensuring the CAM Team meets on a regular basis and that members are kept informed on progress of specific programs.
- Coordinating the implementation of specific actions recommended by the Climate Action Plan. This includes developing work programs and budgets and working with the CAM Team and community members.
- Coordinating the budget for climate programs and working to secure long-term financing for programs.
- Annual monitoring of emissions reductions.
- Reporting annually to the City's Sustainability Committee, and to other appropriate committees or boards on progress towards achieving the long-term emissions reductions goals.
- Recommending new actions and programs, not included in the CAP, as new technology comes to market and as state and federal legislation changes.

Annual Progress Review

Recommendations:

4. The City develop a review process for evaluating the effectiveness of emissions reduction programs.
5. The CAM Team report annually to the City Council on progress towards meeting emissions reductions goals.

"What gets measured, gets done." This is the first principle listed in Hayward's 12 City Leadership Principles, which were adopted in 2007.[105] Measuring GHG emissions on a regular basis and verifying that climate programs are effectively reducing emissions is a critical step to ensuring that Hayward's programs are resulting in emissions reductions. It is recommended therefore, that the CAM Team report annually on progress towards meeting emissions reductions goals. Regular reporting has several benefits, including:

- Provides the CAM Team with a reason to evaluate how effective programs are at reducing emissions.
- Allows the CAM Team to make adjustments as necessary, to funding and program design, to keep the programs on track.
- Keeps the CAM Team on task to meet both short-term and long-term goals

In addition to reporting on emissions reductions, it is recommended that the City develop a review process for evaluating the effectiveness of each program that aims to reduce emissions. Hayward should work within the City's existing review protocols and aim to create a review process that is rigorous enough to provide an accurate picture of the progress Hayward is making towards reducing emissions. The review process should not be so time-consuming that it significantly detracts from efforts to develop and administer emission-reduction programs.

[105] Human Resources Director. City of Hayward, California. http://www.peckhamandmckenney.com/pdfs/HaywardHRD-web.pdf

Citizen and Business Participation

Recommendations:

6. The City encourages individual businesses and business groups to participate in efforts to reduce GHG emissions by the commercial sector.
7. The City encourages residential sector developers, multi-family building owners, and residents to participate in reducing emissions by the residential sector.

Recommendation:

When prioritizing actions, the City should weigh the following factors: estimated emissions reductions, cost of implementation, ease of implementation, and the time required for the program to reach full implementation.

Hayward's citizens and businesses will play a critical role in the Climate Action Plan implementation. As discussed in Strategy 9, without active participation, climate programs will not be as effective as planned. Hayward will not meet emissions targets without community participation. Community participation is so essential to success that the CAP recommends specific actions to engage the community in the process (see Strategy 9).

Prioritizing Actions to Implement

Recommendation:

8. When prioritizing actions, the City should weigh the following factors: estimated emissions reductions, cost of implementation, ease of implementation, and the time required for the program to reach full implementation, and financial benefits or cost savings.

One of the challenges of implementing the CAP is determining which actions to implement first. To help determine which actions to prioritize, the City evaluated actions by scoring each one based on four criteria, which are described in more detail in the following pages:

1. Ease of implementation
2. Time to achieve full implementation
3. Potential emissions reductions
4. Cost

Table 11 presents the CAP actions, the scores they received during the prioritization process, and relative rankings of each action. The maximum possible score was 100 points, and the actions receiving highest scores were considered to be highest priority for implementation. The scoring process is described in more detail in Appendix D. The complete score-card for each action is also presented in Appendix D.

The scoring process is one tool the City can use to determine which actions to implement, but it should not be the only tool. More than anything else, the scoring process provides the City with a mechanism to review the actions and to identify potential barriers to implementation.

Based on the action prioritization, the City developed a recommended schedule for implementing the various actions. Depending on economic and other conditions at the time, the City may decide to adjust

the implementation timing. If the City does adjust the implementation schedule in order to meet other City priorities, it is important that where possible, implementation continues to occur across each of the transportation, energy, and waste sectors rather than focusing on implementing actions in one sector only.

Community-wide Actions – in order of priority

Table 11: Proposed actions for reducing community-wide emissions: listed in order of priority

Action Number	Short Description	Estimated Annual Emissions Reductions (metric tons CO2e) *assumes Scenario 2 fuel economy and renewable electricity generation and that program goals are achieved		Priority
		2020	2050	
Community-wide Actions - potential emissions reductions calculated and City has direct control over implementation				
Action 3.9	offer energy efficiency financing program for commercial buildings	1,630	132,025	1
Action 3.3	develop and implement Commercial Energy Conservation Ordinance	5,164	105,152	2
Action 3.7	energy efficiency financing program for single-family homes	181	40,248	3
Action 3.8	offer energy efficiency financing program for multiple-family homes	126	33,617	4
Action 5.2	offer renewable energy financing program for commercial buildings	10,768	22,822	5
Action 6.3	improve construction and demolition debris program	1,953	15,634	6
Action 4.2	continue to implement private development green building ordinance for commercial buildings	4,493	77,925	7
Action 5.3	add solar requirement into private development green building ordinance	2,980	24,660	8
Action 4.1	continue to implement private development green building ordinance for residential buildings	979	18,836	9
Action 1.8	prioritize traffic-flow management practices to reduce idling time	23,061	21,875	10
Action 3.1	develop and implement Residential Energy Conservation Ordinance for single-family homes	639	39,304	11
Action 3.2	develop and implement Residential Energy Conservation Ordinance for multiple-family homes	983	33,033	12
Action 6.2	increase participation in food-scraps collection programs	1,495	11,963	13
Action 6.1	increase participation in recycling programs	15,916	38,216	14
Action 5.1	offer renewable energy financing program for residential buildings	850	2,149	15
Action 1.4	expand public transit services to encourage reductions in vehicle travel	3,062	15,199	16
Action 5.4	increase portion of electricity provided by renewable energy		30,779	17
Action 1.2	assist businesses in establishing car share / bike-share programs	416	7,283	18
Action 6.6	encourage waste reduction and promote recycling participation at multi-family properties	253	304	19
Action 7.1	maximize carbon sequestration within City		284	20
Action 1.1	assist businesses in providing commuter benefits programs	2,286	8,106	21
Action 1.5	continue to implement bike master-plan	2,419	7,610	22
Action 1.3	update parking policies to encourage reduction in vehicle travel		9,471	23
Action 1.6	develop and implement pedestrian master-plan	1,394	7,121	24
Action 6.4	ban certain materials from landfills	2,487	2,986	25
Community-wide Actions - potential emissions reductions not calculated, or City does not have direct control over implementation				
Action 3.4	actively participate in low-income weatherization programs	emissions reductions not quantified		1
Action 2.2	collaborate the state and federal government on policies that promote low-carbon vehicles and low-carbon fuels	129,060	532,735	2
Action 2.1	provide incentives for low-carbon vehicles and low-carbon fuels	129,060	532,735	3
Action 1.10	align zoning policies to minimize vehicle travel	emissions reductions not quantified		4
Action 3.5	promote a voluntary commitment for businesses and residents to reduce energy consumption	emissions reductions not quantified		5
Action 6.7	prefer waste management strategies that maximize the useful value of waste streams	emissions reductions not quantified		6
Action 6.5	require residents / businesses to participate in recycling programs	emissions reductions not quantified		7
Action 1.11	increase availability of affordable housing for people employed in Hayward	emissions reductions not quantified		8
Action 9.1	create green-portal website	emissions reductions not quantified		9
Action 9.2	develop and implement plan to engage residents in emissions reductions activities	emissions reductions not quantified		10

Action Number	Short Description	Estimated Annual Emissions Reductions (metric tons CO2e) *assumes Scenario 2 fuel economy and renewable electricity generation and that program goals are achieved		Priority
		2020	2050	
Action 9.3	develop and implement plan to engage businesses in emissions reductions activities	emissions reductions not quantified		11
Action 3.6	promote use of home energy monitors	emissions reductions not quantified		12
Action 1.7	update the Circulation Element of the General Plan to evaluate expansions of appropriate modes of transit	emissions reductions not quantified		13
Action 1.9	encourage high density, mixed-use, smart-growth development in areas near public transit stations	emissions reductions not quantified		14
Action 1.12	incentivize filling local jobs with local residents	emissions reductions not quantified		15
Action 8.1	*Place holder - no actions defined for climate change adaptation*	not evaluated		--

Municipal Actions – listed in order of priority

Table 12: Proposed actions for reducing municipal emissions: listed in order of priority

Action Number	Short Description	Estimated Annual Emissions Reductions (metric tons CO2e) *assumes Scenario 2 fuel economy and renewable electricity generation and that program goals are achieved		Priority
		2020	2050	
Municipal Actions - potential emissions reductions calculated and City has direct control over implementation				
Action 3.10	upgrade streetlights to LEDs	969	1054	1
Action 2.3	procure fuel-efficient and low-carbon fuel vehicles for municipal fleet	54	108	2
Action 3.12	audit city buildings and identify energy savings opportunities	330	1542	3
Action 3.11	prepare and implement energy conservation plan for municipal buildings	330	1542	4
Action 2.4	negotiate alternative-fuel and fuel economy requirements into new contracts and franchise agreements	54	108	5
Action 6.9	implement food scraps collection programs in city buildings	73	163	6
Action 5.5	audit city buildings and identify buildings best-suited for solar	76	2227	7
Action 5.6	install renewable generation on municipal property	76	2227	8
Action 4.3	continue to implement municipal green building ordinance	47	328	9
Action 7.2	maximize carbon sequestration on municipal property	5	32	10
Action 6.8	implement recycling programs in city buildings	27	28	11
Municipal Actions - potential emissions reductions not calculated, or City does not have direct control over implementation				
Action 1.13	provide commuter benefits to government employees	emissions reductions not quantified		1
Action 1.15	prefer facilities with convenient access to public transit	emissions reductions not quantified		2
Action 9.4	offer climate education programs to City employees	emissions reductions not quantified		3
Action 4.4	ensure new city buildings are built with photovoltaics and solar hot-water whenever possible	emissions reductions not quantified		4
Action 9.6	when awarding contracts, request applicants provide information about sustainability practices	emissions reductions not quantified		5
Action 9.5	demonstrate leadership by setting municipal reduction targets. Work to achieve these targets	emissions reductions not quantified		6
Action 6.10	develop environmentally friendly purchasing program	emissions reductions not quantified		7
Action 1.14	develop car-share and/or bike-share program for city employees	emissions reductions not quantified		8
Action 8.2	*Place holder - no actions defined for climate change adaptation*	emissions reductions not quantified		9

Costs and benefits

When weighing the costs and benefits of a proposed action, it is recommended that the City take into consideration not only more traditional investment cost metrics such as simple payback, internal rate of return, and net savings, but also consider the life-cycle costs of the action. Traditional cost metrics are useful for evaluating the short-term cost effectiveness of programs, whereas life-cycle costs analysis[106] is helpful when looking at longer-term investments.

The most common metric for evaluating investments is simple payback; this metric ignores the time value of money and provides a straightforward estimate of the time it will take for an investment to pay for itself. The simple payback period is equal to the investment cost divided by the annual savings. For example, a $1,000 investment that saves $500 each year has a two-year simple payback.

[106] Life-cycle cost analysis takes into consideration all costs and benefits associated with a particular investment throughout the entire duration of the investment's useful life.

The federal government has chosen to implement all efficiency projects with a payback of ten years or less, but in principle any project that pays back its initial investment in less than the measure's anticipated lifetime can reasonably be considered worthwhile. Many government agencies also have a policy of implementing comprehensive energy projects that include a range of different actions, where the shorter payback measures can subsidize the cost of longer payback items, to produce an overall payback period that is acceptable.

When evaluating benefits of a proposed action, it is suggested that the City place value not only on the GHG emission reductions, but also on non-GHG reductions benefits such as health benefits, decreases in water and air pollution, job creation, growth of the local "clean-tech" industry, improved worker or student productivity, or community and economic development. For example, reducing vehicle miles traveled will also improve overall air quality and may result in a decrease in air quality related health problems such as childhood asthma. Reducing the number of vehicles on the road may also reduce the risk of accident-related injury and may reduce local traffic-related noise pollution. Similarly, improving walkability in the community may result in improved pedestrian safety and have other general health benefits.

Time to full implementation

When prioritizing actions to implement, it is important to consider how long it will take for actions to be fully implemented and to plan ahead to ensure that emissions reductions are realized in time to meet the long-term emissions targets. Initially there is likely to be an emphasis on actions that are easy to implement and that result in immediate emissions savings. These short-term results will encourage early confidence in the Plan. However, it is also important that early work is begun on developing longer-term emissions reductions strategies that will require more extensive up-front work, but that will still result in emissions savings long after the low-hanging-fruit have been taken.

For actions that may take longer to implement, or where there may be some initial opposition, the Draft Plan recommends using a phase-in approach where the first phase of implementation may not result in major emissions savings, but provides a stepping stone for the next and more productive phase of the program. For example, when developing and introducing a residential energy conservation ordinance, Hayward could initiate implementation in stages. The first stage might only provide information on the cost saving benefits of certain retrofit measures; a later stage might require building owners to perform an energy audit before a building is sold, and require the owners to disclose the audit results to a prospective purchaser. Depending upon the success of the information-only and audit programs at reducing emissions, the City could then consider a stricter version of the ordinance which would require building owners to perform the audit and then also make prescribed efficiency improvements at the time the building is sold. Similar residential programs already successfully operate in San Francisco and Berkeley.

Although the audit-only program just provides the prospective building owner with information on the energy performance of the building and may not actually save much energy or reduce emissions, it can serve several other purposes. Over time the City will develop a better sense of how local residential buildings are performing. With this data, the City will be better informed when developing later phases of the program. In addition, the information may encourage building owners and realtors to become more aware of the value of energy efficiency in buildings and the contribution lower energy costs can make to increasing home ownership. This increased awareness may ease the introduction of subsequent and more demanding emissions reduction requirements.

The proposed timeline for implementing the CAP programs is presented in Appendix E.

Ease of implementation

In order to assess the ease with which a future emissions reduction action may be implemented, the City could consider the following:

- Is there widespread political and community support for the proposed action?
- Are there existing policies such as the City's general plan that must be changed in order to fully implement the action?
- Does the City have jurisdiction over any necessary changes that are required for full implementation?
- Is the proposed measure an expansion of an existing program, or does a new program need to be developed to permit implementation of the proposed measure? Expansions of existing programs are preferred in the earlier stages of implementation as they generally provide quicker results.
- Are there collateral benefits to the community such as local air quality, improved public health, lower health care costs, and improved worker and student performance, and can these benefits be assessed and used to support the introduction of the program?
- Will the action encourage the development of local 'clean-tech' industries?

Finally, it is important to recognize that proposed beneficial actions should not be eliminated from the list even if the current social, political, or economic conditions make those actions difficult to implement. Since the Climate Action Plan is a long-term plan, it is hoped that conditions may change in the future and the proposed action will then become less challenging to implement.

Create and Follow a Financial Plan

Recommendation:

9. The City create a financial plan for the climate action program that takes into consideration the costs and staff resources needed throughout the implementation period as well as financial benefits and cost savings.

To effectively implement the Climate Action Plan, the City will need adequate, reliable, and consistent funding. Without reliable and consistent funding, the City's GHG reduction programs will not be able to meet the long-term targets, or comply with the state and federal GHG reduction mandates that are likely to emerge in the coming years.

Funding for climate programs and associated energy, transit, and solid waste management programs often fluctuate with the ups and downs of the national and local economies because they are often seen as amenities rather than necessities. Inevitably, it is easier to obtain funding and political support for climate-related programs during times of economic confidence than in times of economic distress. Because consistent funding is critical to the effectiveness of climate-related programs, it is important that the City develop a comprehensive financial plan that considers long-term budget needs and that identifies a specific plan to secure funding that is not heavily impacted by annual fluctuations in general fund budget constraints. The financial plan should include the following components:

Review of existing budget conditions

Hayward already has a number of climate-related programs that are receiving money from a variety of funding sources. When drafting the financial plan, Hayward should identify all of these programs, review

their budgets, and evaluate their funding sources. This internal review process will enable Hayward to develop a clear picture of how its existing climate programs are funded and how the programs are performing from a financial perspective. After the review is complete, the City will have a better idea of what funding mechanisms are most successful.

Identify Costs and Funding Sources

Many of the actions in the Plan will eventually be developed into programs that will have their own budget and staffing needs. There will be costs associated with each individual program, costs associated with coordinating the various climate-related programs, and costs for tracking and reporting. There will also be costs for marketing and education efforts that are critical for a successful program kick-off, and to encourage people to participate in the new programs.

Costs associated with coordinating the various climate-related programs include:

- Sustainability Coordinator's salary
- Marketing and outreach staff for ongoing marketing efforts
- Preparing emissions inventory and reporting on progress towards meeting emissions targets.

- Potential funding sources are discussed at the end of this Section of the Plan. Short-term funding sources, grants, and loans for example, are often effective ways to cover the up-front costs of developing programs, but are often not available for long-term program operations. Other longer-term funding sources are better for the more consistent and less expensive costs like program operational costs.

Coordinating budgets across various City departments

Climate-related programs are likely to be managed by individuals from different City departments, which means individual program budgets will likely to be housed in many different City departments. This can make it difficult to keep track of spending. It is recommended that the Sustainability Coordinator help facilitate program tracking. Tracking program budgets will also help the City make informed decisions about how to pursue future funding opportunities.

Financing the Climate Program

Recommendation:

10. The City evaluate alternative climate financing methods in order to provide adequate, reliable, and consistent long-term program funding.

Municipalities have responded to the need for consistent long-term energy and related climate program funding in a variety of ways. Some programs rely on the traditional local government budgeting process for funding, which may make the programs vulnerable to changing perceptions of the importance of continued emissions reductions efforts. Unfortunately, many of these programs cannot easily be stopped and restarted without a serious loss of momentum. Some cities have avoided the drawbacks of relying on the annual budgeting process by utilizing other funding mechanisms such as bonds, public works

fees, grants, and a variety of other mechanisms. Several potential funding mechanisms are described below.[107]

Local Funding Sources

Taxes and Bonds

Hayward could consider public financing of climate projects through bonds and taxes. This funding mechanism has been developed in San Francisco, Berkeley, and Emeryville where voters have approved public bonds for solar investments, development of a climate action plan, and a property tax assessment on commercial areas to fund a local shuttle to connect to BART, in the three cities respectively.[108] However, tax and bond measures can be difficult to pass as they often require approval by two-thirds of voters.[109]

In November 2006, the City of Boulder, Colorado's voters approved Initiative 202 – the Climate Action Tax Plan that went into effect on April 1, 2007. The revenues generated through the tax will be targeted at reducing greenhouse gas emissions generated by energy use in buildings, the operation of vehicles, and landfill gas emissions. The tax is a surcharge based on a per-kilowatt-hour electricity usage charge with an annual cap. The tax is collected by the local utility as part of the normal billing process; however, customers who subscribe to the utility's premium priced renewable energy portfolio are exempt.

Fees

Revenues from public services fees (e.g., parking fees, utility fees) can be used to fund programs such as transit improvements and water use efficiency. Hayward is already utilizing this funding mechanism: the City operates its own water utility and uses some of the proceeds from higher water rates to fund water conservation programs. Some fees (e.g. for water and wastewater) can be raised to cover costs without direct voter approval.

The City of Portland Oregon imposed a 1 percent surcharge (with a ceiling of $15,000 per department) on departmental energy bills. The money went into a central fund to support a City energy specialist who acts as the representative on energy issues for the departments, interfacing with the energy utilities, staying in touch with current utility energy rebates and other technical assistance available, and providing technical support for departmental energy projects.

Impact fees

Local governments have the authority to include emissions mitigation fees as impact fees on new development. For instance, The City of Chula Vista plans to fund energy retrofits of existing buildings with revenues generated from mitigation fees developers pay when new buildings do not meet a minimum energy performance threshold. The Sacramento Metropolitan Air Quality Management District is considering emissions mitigation fees for new development.[110]

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[107] Public Policy Institute of California. Ellen Hanak, Louise Bedsworth, Sarah Swanbeck, and Joanna Malaczynski. *Climate Policy at the Local Level: A Survey of California's Cities and Counties.* November 2008.

[108] Berkeley's voter-approved Measure G (2006) provides for the City to go forward with a climate action plan while recognizing that the costs of implementation are yet unknown.

[109] Local general obligation bonds (except for education) and special purpose taxes and property assessments all require a two-thirds voter majority. Property assessments can also be approved by a majority of property owners.

[110] Public Policy Institute of California. Ellen Hanak, Louise Bedsworth, Sarah Swanbeck, and Joanna Malaczynski. *Climate Policy at the Local Level: A Survey of California's Cities and Counties.* November 2008.

Local residents are often more receptive to new mitigation fees than they are to increases in taxes or increases to existing fees; however, developers are often opposed to new mitigation fees increasing the cost of business.

Other Funding Sources

Grants and low-interest loans

Federal, state, and regional agencies provide grants and loans for investments in a variety of climate-related projects. Grants and loans are usually not a good source for long-term funding for on-going programs. However, the short-term funding they provide can be useful for short-term program development and program testing. Hayward could use grants and loans to pay for the up-front staff time required to develop programs, and then establish an alternative financial framework for the program's continued operation after the grant expires. Hayward has already been successful at securing grants for their emissions reductions efforts: this Climate Action Plan was funded, in part, by a grant from the Bay Area Air Quality Management District.

The most promising new source of funding for energy programs in cities is the Energy Efficiency and Conservation Block Grant (EECBG) program originally proposed in the 2007 Energy Independence and Security Act of 2007 and was funded by the American Recovery and Reinvestment Act of 2009. Hayward was allocated $1.37 million through the Block Grant program. Grant funds are available to support a wide range of energy related activities including energy program planning, policy making, public education, energy project financing, and installing energy measures in local government buildings (see Appendix F).

Greenhouse gas reduction measures included in Hayward's GHG reduction plan, such as bike lanes and pedestrian improvements, installing on-site renewable energy technologies, and providing initial start-up funding for local energy revolving funds are all specifically included as measures eligible for funding.

The California Energy Commission (CEC) has for many years provided a loan program to support local government energy retrofit and some new construction projects. The program provides low interest loans for feasibility studies and the installation of cost-effective energy projects in schools, hospitals, and local government facilities. The loans are repaid out of the energy cost savings and the program will finance lighting, motors, drives and pumps, building insulation, heating and air conditioning modifications, streetlights and traffic signal efficiency projects, and certain energy generation projects, including renewable energy projects and cogeneration. Loans can cover up to 100 percent of project costs and there is a maximum loan amount of $3 million. [111]

The City may also consider working with BAAQMD, MTC, and other organizations that provide funding for local transportation projects to establish more flexibility in their funding criteria.

The City of Hayward can leverage its locally available funding by participating in county-wide projects like the programs being coordinated by StopWaste.org. This could increase the likelihood of receiving competitive funding from federal, state and regional grantors. In addition, the City will benefit from economies of scale in program administration, bulk purchasing, and consumer outreach.

[111] For more information see www.energy.ca.gov/efficiency/financing

Support from local businesses, non-profits, and agencies

Hayward may find that partnering with local utilities, businesses, and non-profits can be useful. In various cities, including Walnut Creek and San Jose, businesses and non-profits are financing climate-related projects such as efficiency retrofits, tree planting, and educational programs.[112]

Self-funding and revolving fund programs

For programs that result in direct cash savings after an initial investment, such as energy efficiency retrofits and green building standards, it is possible to set up a self-funding loan program where loan payments are equal to, or proportional to, cost savings. This is the idea behind Berkeley's Solar Initiative, for which the City is obtaining initial program seed financing from a private bank. Residents can take out a loan to pay for installing a solar electric system, and they then repay the loan through a property assessment. Over time, the loan fund will be replenished from the loan repayments and the City will in turn repay the bank and will be able to fund further investments in solar.

The best-known local government example of a fully operational revolving fund is that operated by the City of Phoenix. The City began its energy management program following the energy crises of the late 1970's, and by 1983 the program had fully established its credibility and the City Council felt confident enough of the program's savings to establish a reinvestment program. This mechanism authorized 50 percent of the documented energy avoided costs from retrofits of City municipal buildings to be reinvested in additional energy efficiency retrofit improvements in the City's departments. Any savings over a set amount would go to the City's general fund, and in general, the energy program is entirely self-supporting.[113]

Agreements with private investors

There are also private investors that can provide funding to local governments. For example, energy service companies (ESCOs) can finance the up-front investments in energy efficiency, for which the local government will then reimburse the company over an agreed period. Similarly, private companies will finance solar power installations, and then recoup their investment by selling the resulting power to the building owner.

Selling carbon offsets

In the future, for projects that are expected to reduce emissions significantly, the emerging carbon offset market could become a potential source of funding for projects. It is likely that the United States will institute a national carbon cap and trade system in the coming years. Cities like Hayward may then be able to sell carbon offsets to other communities or businesses that have not been as successful at reducing GHG emissions.

Cross-funding activities

Recognizing that some programs will cost money and some will save money, some communities are taking a comprehensive view to the funding issues identifying opportunities for cost sharing. For example, the City of Roseville is considering borrowing against future energy savings to fund a comprehensive climate action plan.[114]

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[112] Public Policy Institute of California. Ellen Hanak, Louise Bedsworth, Sarah Swanbeck, and Joanna Malaczynski. *Climate Policy at the Local Level: A Survey of California's Cities and Counties.* November 2008.

[113] To help give the impression that money saved is not sitting around waiting to be spent, program staff in Phoenix refer to the monetary benefits of projects as "cost avoidance" rather than "cost savings."

[114] Public Policy Institute of California. Ellen Hanak, Louise Bedsworth, Sarah Swanbeck, and Joanna Malaczynski. *Climate Policy at the Local Level: A Survey of California's Cities and Counties.* November 2008.

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Section 7 – Ongoing Measurement and Verification

Why Measure and Verify

The success of the long-term carbon reduction program depends on regular monitoring. Regular monitoring is important because it:

Enables informed decisions about climate-related programs

Without accurate up-to-date information on whether programs are effective and operating as planned, it may be difficult to make informed decisions about setting future priorities, determining appropriate program funding and scheduling, and identifying whether there is a need to adjust the program approach to ensure the long-term emissions targets are being achieved.

Provides credible and defensible data to prove accountability

Monitoring and reporting on progress will help the City demonstrate to the community and to other jurisdictions that Hayward is upholding its commitment to reducing emissions. In adopting the CAP, the City will be making a major commitment to reducing emissions by more than 170,000 metric tons CO_2e below business-as-usual projections by 2020. By measuring emissions, Hayward will have credible and defensible data to prove that the community is taking its emissions reduction campaign seriously.

Prepare for future reporting requirements

Regular monitoring will also help prepare Hayward for GHG reporting requirements that are likely to emerge in the future. It is probable that at some time cities and other government agencies, together with private sector businesses, will be asked to disclose annual GHG emissions. By voluntarily adopting standardized methodologies to measure community-wide GHG emissions, Hayward will be prepared if or when reporting becomes mandatory.

On August 27, 2007, Governor Schwarzenegger signed SB 85, which requires every state agency to prepare an annual report card, which lists actions the agency has implemented to reduce GHG emissions and reports actual emissions reduced by each action.[115] This illustrates that some government departments are already being asked to track GHG emissions, and it is not unreasonable to believe that local governments may be asked to report on their emissions in the near future.

[115] Senate Bill 85. Committee on Budget and Financial Review. Chapter 178. Statues of 2007. http://www.leginfo.ca.gov/pub/07-08/bill/sen/sb_0051-0100/sb_85_bill_20070824_chaptered.pdf

What to Measure

Recommendations:

11. The City complete a full emissions inventory every three to five years to measure and verify that emissions are actually decreasing over time.
12. The City collect information about and evaluate the effectiveness of climate programs on a regular basis

It is recommended that Hayward complete a full emissions inventory every three to five years to measure and verify that emissions are actually decreasing over time as planned. It is also recommended that Hayward collect other program-specific information on all of the individual programs that are contributing to the emissions reduction effort, so that each program can also be regularly evaluated. The evaluation will inform City decision-making on appropriate future funding levels; help identify any need for adjustments to the program design, and enable the City to evaluate the effectiveness of the individual programs.

Community-wide Inventory

A community-wide emissions inventory should be completed on a regular basis to ensure that emissions are decreasing over time. It is important that each inventory be conducted using the same methodology that was used to prepare the baseline inventory. If future inventories follow a different methodology than the baseline inventory, it will be very difficult to compare program effectiveness over time. If, for example, the baseline inventory does not include GHG emissions from the airport and a future inventory does, it could appear that GHG emissions have increased substantially over the time period between the two inventories. In reality, emissions may have decreased, but the reduction was obscured by the changed methodology. It is important therefore, that the baseline and future inventories include emissions from the same sources, evaluate the same global warming gasses,[116] and maintain the same physical boundaries. As calculation methods improve, Hayward should update the baseline inventory using the new method.

To ensure that all inventories follow the same methodology, it is suggested that Hayward continue to use ICLEI's calculation methodology and its standardized calculation methods. This will provide a high degree of confidence in the results of the City's programs to reduce emissions, and also allow program comparisons to be made with the more than 700 cities across the world that are currently using, or plan on using ICLEI's methodology to calculate their emissions. ICLEI is working closely with other organizations that publish emissions inventory methodologies, such as California Climate Action Registry (CCAR), to ensure that the methodology remains credible, reliable, and coordinated with other emerging methodologies.

As ICLEI improves calculation methodologies, Hayward should update its baseline inventory to reflect changes. Similarly, as Hayward starts to include more emissions sources in their emissions calculation, the baseline inventory should be updated to include the new emissions sources. The baseline inventory should also be updated if the City's physical boundaries change.

[116] There are hundreds gasses that are known to contribute to the greenhouse effect. Generally, inventories only account for emissions of the most common gases.

Program indicators

Collecting and organizing data is generally the most time consuming, and thus most expensive, aspect of emissions monitoring. Costs can be minimized by having a responsible and organized individual coordinate the data collection process. It is recommended that the City's Sustainability Coordinator be responsible for managing the emissions monitoring and verification program. The data collection and management process may also be simplified through the maintenance of good working relationships with other local agencies that collect and manage critical data. The key indicators and the responsible agencies are listed below:

Table 13: Indicators that can be used to evaluate programs

Transportation	
Indicator	**Data Source**
Vehicle Miles Traveled	Metropolitan Transportation Commission (MTC)
Mode of commute	MTC, City Analysis, Census Bureau
Transit Ridership	AC Transit, BART, MTC, City Analysis, Census Bureau
Transit passes sold	AC Transit, BART, MTC, City Analysis
Fuel economy of local fleet	National Highway Traffic Safety Administration, ICLEI
New smart-growth development	City Analysis
Energy	
Indicator	**Data Source**
Energy audits performed	City Analysis
Number of efficiency retrofits performed	City Analysis
Number of buildings installing solar panels	City Analysis
Number of energy monitoring systems installed	City Analysis
Electricity Consumed	PG&E
Natural Gas Consumed	PG&E
Emission factor of electricity supplied to City	PG&E
Water consumption	Public Works
Solid Waste	
Indicator	**Data Source**
Diversion rates	City Analysis
Waste characterization surveys	Stopwaste.org, Hayward Public Works Department, California Integrated Waste Management Board
Tonnage recycled and disposed, by sector	City Analysis
Recycling rates, i.e., capture rates for specific recyclable material types at the County and State level	Stopwaste.org, Hayward Public Works Department, California Integrated Waste Management Board
Community Participation	
Indicator	**Data Source**
Number of children & adults educated on GHG-related issues	City analysis, Hayward Unified School District
Businesses certified in Green Businesses	Alameda County Green Business Program
Number of businesses taking advantage of efficiency and solar financing programs	City analysis

When to Measure

It is recommended that Hayward, at a minimum, perform a complete community-wide emissions inventory five years after the Action Plan is adopted as well as in 2020 and 2050. The five-year inventory will enable the City to determine if their climate programs are resulting in real emissions savings. The 2020 and 2050 inventories will enable the City to verify emissions targets have been achieved. To track progress more closely, the City may decide to perform a full inventory more often. In the future as data sources and GHG information management processes become better developed, emissions inventorying may become streamlined and easier to manage than it is today, so the City may then be able to consider performing at least partial inventories of critical programs on an annual basis.

Calculating a community-wide invention can require a substantial time commitment from one or more staff members. Efforts to conduct inventories can detract from efforts to implement programs. Since the goal is to reduce emissions—not to report on emissions—it is important that Hayward find a balance between dedicating staff time to programs and dedicated staff time to evaluating the effects of programs. In future years, as inventory methodologies improve and as more practical tools are developed, calculating a community-wide inventory may be less time-intensive and less costly. Even if the City does not complete a full community-wide emissions inventory every year, it is recommended that the City develop a protocol for evaluating the effectiveness of the individual emissions reduction programs on an annual basis. The City can use the indicators listed above in Table 13 in the annual analyses.

Voluntary Reporting

The City may consider participating in organizations such as the California Climate Action Registry (CCAR), or EPA's Climate Leadership program. There are several reasons to consider participation in one or more of these programs. First, it will provide the City with a mechanism to obtain independent third-party verification that the City's inventories are accurate, complete, and diligent. Second, following these protocols will ensure that the City's inventory is consistent, and therefore comparable, with the inventories of other participants. Third, it will provide the City with an incentive to complete inventories on a regular basis. Finally, many of these organizations offer a variety of services to help members calculate emissions and meet reduction targets, and Hayward will have access to these services if the City becomes a member.

Hayward could also consider encouraging the development of a new local membership organization of East Bay cities and special districts, perhaps modeled on the very successful peninsula organization - Sustainable Silicon Valley, which offers tools and resources for members who pledge to reduce emissions. The benefits include guidance from other members, annual reporting tools to help measure progress, and public recognition.

Other groups include the Business Council on Climate Change (BC3), which hosts events at which members can share best practices for internal emissions reductions, and the EPA's Climate Leaders, which provides up to 60 hours of free technical assistance to participants who set GHG targets to be achieved over 5-10 years. Participation in one or more of these organizations can add value to the City's efforts in the form of technical assistance, venues for sharing of lessons learned, and best practices and recognition for the comprehensive and aggressive efforts planned for GHG reductions.

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Appendix A: Baseline Emissions Detailed Reports

Community Greenhouse Gas Emissions in 2005
Detailed Report

	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)
Hayward, CA			
Residential			
Hayward Community Residential			
Electricity	54,252	4.6	242,674
Natural Gas	104,277	8.8	571,258
Subtotal Hayward Community Residential	158,528	13.4	813,932

1. The updated 2005 PG&E CO2e emission factor of 0.49 lbs/kWh of delivered electricity was verified by the California Climate Action Registry and was reported to ICLEI in January 2007 by Greg San Martin. The PG&E CO2e emissions factor of 53.05 kg/MMbtu of delivered natural gas, verified by the California Climate Action Registry and the CEC. The PG&E coefficient set does not have emissions factors for CH4 and N2O as the CO2e emissions factor includes CH4 and N2O emissions in CO2 equivalents.

2. The business-as-usual projections for 2020 assume no change in the PG & E CO_2e emissions factor.

3. Default criteria air pollutant emissions factors are based on the Region 13 - Western Systems Coordinating Council/CNV Average Grid Electricity Set.

4. Industrial consumption data is reported within the Commercial sector due to PUC confidentiality rules that prohibit the release of such data in certain cases. As a result, NOx and criteria air pollutants are underreported. Hence the commercial sector includes energy consumed in the industrial sector of the city. The commercial sector also includes energy consumed by city buildings/operations and facilities as well as the district facilities like the East Bay Municipal Utility District (EBMUD), Bay Area Rapid Transit (BART) and School Districts.

Data Sources:

1. Community electricity and natural gas data provided by Data collection coordinator byVera Dahle Lacaze, Solid Waste Manager, Hayward City, Vera.Dahle-Lacaze@hayward-ca.gov, (510) 583-4725
2. Request for electricity and natural gas data processed by Greg San Martin, Climate Protection Program Manager, PG&E, GJS8 @pge.com, (415)973-6905 and Jasmin Ansar, Manager, Environmental Policy, PG&E, JxA2@pge.com, (415)973-4570.

Data entry: Data entered on September 27, 2006 by Palak Joshi, Program Assistant, ICLEI, palak.joshi@iclei.org. ICLEI supervisor, Timothy Burroughs, timothy.burroughs@iclei.org. Last updated on July 15, 2008 by Jennifer Holzer, Program Associate, ICLEI, jennifer.holzer@iclei.org, 510-844-0699.

Subtotal Residential	158,528	13.4	813,932
Commercial			
Community Commercial/Industrial			
Electricity	151,793	12.8	678,989
Natural Gas	86,434	7.3	473,507
Subtotal Community Commercial/Industrial	238,226	20.1	1,152,497

1. The updated 2005 PG&E CO2e emission factor of 0.49 lbs/kWh of delivered electricity was verified by the California Climate Action Registry and was reported to ICLEI in January 2007 by Greg San Martin. The PG&E CO2e emissions factor of 53.05 kg/MMbtu of delivered natural gas, verified by the California Climate Action Registry and the CEC. The PG&E coefficient set does not have emissions factors for CH4 and N2O as the CO2e emissions factor includes CH4 and N2O emissions in CO2 equivalents.

This report has been generated for Hayward, CA using STAPPA/ALAPCO and ICLEI's Clean Air and Climate Protection Software developed by Torrie Smith Associates Inc.

Community Greenhouse Gas Emissions in 2005
Detailed Report

	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)

2. The business-as-usual projections for 2020 assume no change in the PG & E CO_2e emissions factor.

3. Default criteria air pollutant emissions factors are based on the Region 13 - Western Systems Coordinating Council/CNV Average Grid Electricity Set.

4. Industrial consumption data is reported within the Commercial sector due to PUC confidentiality rules that prohibit the release of such data in certain cases. As a result, NOx and criteria air pollutants are underreported. Hence the commercial sector includes energy consumed in the industrial sector of the city. The commercial sector also includes energy consumed by city buildings/operations and facilities as well as the district facilities like the East Bay Municipal Utility District (EBMUD.

Data Sources:
1. Community electricity and natural gas data provided by Data collection coordinator byVera Dahle Lacaze, Solid Waste Manager, Hayward City, Vera.Dahle-Lacaze@hayward-ca.gov, (510) 583-4725
2. Request for electricity and natural gas data processed by Greg San Martin, Climate Protection Program Manager, PG&E, GJS8 @pge.com, (415)973-6905 and Jasmin Ansar, Manager, Environmental Policy, PG&E, JxA2@pge.com, (415)973-4570.

Data entry: Data entered on September 27, 2006 by Palak Joshi, Program Assistant, ICLEI, palak.joshi@iclei.org. ICLEI supervisor, Timothy Burroughs, timothy.burroughs@iclei.org. Last updated on July 15, 2008 by Jennifer Holzer, Program Associate, ICLEI, jennifer.holzer@iclei.org, 510-844-0699.

Reference file: ICLEI Hayward Summary Report

Subtotal Commercial	238,226	20.1	1,152,497
Transportation			
Community Transportation			
Gasoline	227,502	19.2	926,325
Diesel	59,429	5.0	208,359
Subtotal Community Transportation	286,931	24.2	1,134,684

Notes:
1. The VMT data provided by MTC and Caltrans is in Daily VMT (DVMT) (000); Annual VMT = DVMT x 365x1000.

2. The VMT by fuel and vehicle type is calculated using Alameda County VMT % (by vehicle type) and the CACP fleet breakdown by fuel type provided by EMFAC.

Data Sources:
1. Local Roads Vehicle Miles Traveled (VMT) 2005 data provided by Harold Brazil, Air Quality Associate, Metropolitan Transportation Commission (MTC) hbrazil@mtc.ca.gov <mailto:hbrazil@mtc.ca.gov> (510) 817-5747. Data analyzed by Micah Lang, Program Officer, ICLEI.

2. State Highways Vehicle Miles Traveled (VMT) 2005 data provided by CalTrans, analyzed by Micah Lang, ICLEI Program Officer and Theresa Krebs, ICLEI. Data source file: 2005 Public Roads Data, HPMS division of CalTrans <http://www.dot.ca.gov/hq/tsip/hpms/hpmslibrary/hpmspdf/2005PRD.pdf>

3. EMFAC data provided in November, 2007 by Amir Fanai, Principal Air Quality Engineer, Bay Area Air Quality Management District, AFanai@baaqmd.gov <mailto:AFanai@baaqmd.gov>

Data entry:

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Community Greenhouse Gas Emissions in 2005
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	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)

2. State Highways Vehicle Miles Traveled (VMT) 2005 data provided by CalTrans, analyzed by Micah Lang, ICLEI Program Officer and Theresa Krebs, ICLEI. Data source file: 2005 Public Roads Data, HPMS division of CalTrans <http://www.dot.ca.gov/hq/tsip/hpms/hpmslibrary/hpmspdf/2005PRD.pdf>

3. EMFAC data provided in November, 2007 by Amir Fanai, Principal Air Quality Engineer, Bay Area Air Quality Management District, AFanai@baagmd.gov <mailto:AFanai@baagmd.gov>

Data entry:
Palak Joshi, Program Assistant, ICLEI, palak.joshi@iclei.org, (510) 844-0699, on August 25, 2006. Timothy Burroughs, Supervisor, timothy.burroughs@iclei.org. Last updated by Jennifer Holzer, Program Associate, ICLEI, July 2008, jennifer.holzer@iclei.org, 510-844-0699. Reference file ICLEI Hayward Summary Report

Hawyard State Hwy VMT			
Gasoline	354,540	30.0	1,443,589
Diesel	92,615	7.8	324,707
Subtotal Hawyard State Hwy VMT	447,155	37.8	1,768,296
Subtotal Transportation	734,087	62.0	2,902,980

Waste

Hayward, CA

ADC Tonnage			*Disposal Method - Managed Landfill*
Plant Debris	119	0.0	
Subtotal ADC Tonnage	119	0.0	
Landfill Waste			*Disposal Method - Managed Landfill*
Paper Products	29,052	2.5	
Food Waste	9,094	0.8	
Plant Debris	2,276	0.2	
Wood/Textiles	11,898	1.0	
All Other Waste	0	0.0	
Subtotal Landfill Waste	52,319	4.4	

Notes:
1. Community wide disposal figures provided by the California Integrated Waste Management Board (CIWMB) via the *Jurisdiction Disposal and Alternative Daily Cover (ADC) Tons by Facility* portion of the Disposal Reporting System (DRS): <http://www.ciwmb.ca.gov/LGCentral/drs/reports/JurDspFa.asp>.

2. Alternative Daily Cover (ADC) tons by material type provided by the CIWMB via the *Alternative Daily Cover (ADC) by Jurisdiction of Origin and Material Type* portion of the DRS website: <http://www.ciwmb.ca.gov/LGCentral/drs/reports/ADC/ADCMatlType.asp>

3. Waste characterization derived from the *Alameda County Waste Characterization Study 2000*: <http://www.stopwaste.org/home/index.asp?page=590>. Waste categories in the report were bundled to fit the waste categories of the Clean Air and Climate Protection (CACP) software.

4. Methane recovery factor derived from the US EPA AP 42 Emissions Factors report (<http://www.epa.gov/ttn/chief/ap42/index.html>), which

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Community Greenhouse Gas Emissions in 2005
Detailed Report

	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)

Data entry:
Palak Joshi, Program Assistant, ICLEI, palak.joshi@iclei.org, (510) 844-0699, on August 25, 2006. Timothy Burroughs, Supervisor, timothy.burroughs@iclei.org. Last updated by Jennifer Holzer, Program Associate, ICLEI, July 2008, jennifer.holzer@iclei.org, 510-844-0699.

Subtotal Waste	52,438	4.4	
Subtotal Hayward, CA	1,183,279	100.0	4,869,409
Total	1,183,279	100.0	4,869,409

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Government Greenhouse Gas Emissions in 2005
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	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)	Cost ($)
Buildings				
Hayward, CA				
Hayward Centennial Hall				
Electricity	76	0.8	340	39,177
Natural Gas	64	0.7	353	14,465
Subtotal Hayward Centennial Hall	140	1.5	692	53,642

Centennial Hall will be replaced with a larger conference center in near future.

Hayward City Ctr. Bldg Parking Garage				
Electricity	34	0.4	153	17,726
Subtotal Hayward City Ctr. Bldg Parking Garage	34	0.4	153	17,726

No electricity will be consumed for the City Center Parking Garage for Hayward because it will no longer be owned by City Of Hayward after January 2007.

Hayward City Hall				
Electricity	336	3.5	1,504	202,967
Natural Gas	190	2.0	1,039	40,860
Subtotal Hayward City Hall	526	5.5	2,544	243,827
Hayward City Hall Parking Garage				
Electricity	34	0.3	151	19,404
Subtotal Hayward City Hall Parking Garage	34	0.3	151	19,404

Data for usage levels for the City Hall Parking Garage reflects partial usage in 2005 and it would increase in 2020.

Hayward Equipment Management				
Electricity	21	0.2	93	13,982
Natural Gas	15	0.2	83	2,303
Subtotal Hayward Equipment Management	36	0.4	176	16,285

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	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)	Cost ($)
Hayward Facilities				
Electricity	75	0.8	334	42,269
Natural Gas	171	1.8	936	27,778
Subtotal Hayward Facilities	245	2.5	1,270	70,047
This record includes Barnes Ct., Animal Shelter, Facilities Division and Landscape Division				
Hayward Fire Stations				
Electricity	113	1.2	505	68,028
Natural Gas	147	1.5	805	33,757
Subtotal Hayward Fire Stations	260	2.7	1,310	101,785
New Fire Station #7 will utilize slightly more gas and electricity than the current station for the forecast year because the facility's square footage is expected to increase. The current data includes 10 fire stations, 9 of which are operating and Fairview (formerly #8) used as storage and requires electricity usage for alarms, phones, etc.				
Hayward Main Library				
Electricity	64	0.7	285	41,118
Natural Gas	33	0.3	180	7,492
Subtotal Hayward Main Library	96	1.0	464	48,610
By 2020, Main Library will be replaced by a larger facility.				
Hayward Police Department				
Electricity	233	2.4	1,042	12,739
Natural Gas	153	1.6	840	24,656
Subtotal Hayward Police Department	386	4.0	1,882	37,395
The square footage for the Police Department building will increase by 5% by 2020.				
Hayward Police Radio Tower				
Electricity	12	0.1	53	8,139
Subtotal Hayward Police Radio Tower	12	0.1	53	8,139

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Government Greenhouse Gas Emissions in 2005
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	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)	Cost ($)
Hayward Streets and Water Department Buildings				
Electricity	15	0.2	66	10,240
Natural Gas	24	0.2	130	5,375
Subtotal Hayward Streets and Water Department Buildings		0.4	195	15,615
Hayward Utilities Building				
Electricity	26	0.3	116	16,413
Natural Gas	9	0.1	50	2,164
Subtotal Hayward Utilities Building	35	0.4	166	18,577
Hayward Weekes Library				
Electricity	20	0.2	90	12,993
Natural Gas	6	0.1	33	1,516
Subtotal Hayward Weekes Library	26	0.3	123	14,509

1. The updated 2005 PG&E CO2e emission factor of 0.49 lbs/kWh of delivered electricity is verified by the California Climate Action Registry and was reported to ICLEI in January 2007 by Greg San Martin. The PG&E CO2e emissions factor of 53.05 kg/MMbtu of delivered natural gas, verified by the California Climate Action Registry and the CEC. The PG&E coefficient set does not have emissions factors for CH4 and N2O as the CO2e emissions factor includes CH4 and N2O emissions in CO2 equivalents.

2. Default criteria air pollutant emissions factors are based on the Region 13 - Western Systems Coordinating Council/CNV Average Grid Electricity Set.

3. In calculating the cost - Assumption: average cost of kwh =$.14 average cost of therm = $1.22

Data Source:
Data submitted on July, 27, 2006 by Vera Dahle Lacaze, Solid Waste Manager, Hayward City, Vera.Dahle-Lacaze@hayward-ca.gov, (510) 583-4725.

Data entered on Aug. 18, 2006 by Palak Joshi, Program Assistant, ICLEI, palak.joshi@iclei.org, (510) 844 0699. Last updated by Jennifer Holzer, Program Associate, ICLEI, July 2008, jennifer.holzer@iclei.org, 510-844-0699.

Data Source Files:
- For Municipal Operations and facilities - ICLEI_Hayward_Buildings_CY2005
- For Street Lights - ICLEI_Hayward_Streetlights_CY2005
- For Water/Sewage - ICLEI_WstWtrTrtmntPlnt_CY2005
- For Waste - ICLEI_Hayward_MunicipalSolidWaste_CY2005

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Government Greenhouse Gas Emissions in 2005
Detailed Report

	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)	Cost ($)
Subtotal Buildings	1,870	19.4	9,180	665,561
Vehicle Fleet				
Hayward, CA				
Building Inspection fleet - Hayward				
Gasoline	36	0.4	136	9,110
CNG	0	0.0	0	1,096
Subtotal Building Inspection fleet - Hayward	36	0.4	136	10,206
Community Preservation fleet - Hayward				
Gasoline	5	0.1	19	1,273
Subtotal Community Preservation fleet - Hayward	5	0.1	19	1,273
Construction Inspection fleet - Hayward				
Gasoline	35	0.4	133	9,076
CNG	0	0.0	0	2,505
Subtotal Construction Inspection fleet - Hayward	35	0.4	133	11,581
Engineering department fleet - Hayward				
Gasoline	6	0.1	22	1,525
Subtotal Engineering department fleet - Hayward	6	0.1	22	1,525
Equipment Management fleet- Hayward				
Gasoline	21	0.2	78	5,228
Subtotal Equipment Management fleet- Hayward	21	0.2	78	5,228
Facilities department fleet - Hayward				
Gasoline	40	0.4	152	10,094
Subtotal Facilities department fleet - Hayward	40	0.4	152	10,094
Fire department fleet - Hayward				
Gasoline	80	0.8	301	18,709
Diesel	49	0.5	183	11,038
Subtotal Fire department fleet - Hayward	129	1.3	484	29,747
Hayward Airport fleet				
Gasoline	60	0.6	229	14,354
Diesel	9	0.1	32	1,917
Subtotal Hayward Airport fleet	69	0.7	261	16,271

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Government Greenhouse Gas Emissions in 2005
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	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)	Cost ($)
Hayward Housing (Conservation and Inspection)				
Gasoline	9	0.1	32	2,185
Subtotal Hayward Housing (Conservation and Inspection)		0.1	32	2,185
Hayward Landscape Department				
Gasoline	173	1.8	655	43,772
Diesel	10	0.1	36	2,726
Subtotal Hayward Landscape Department	183	1.9	691	46,498
Hayward Library				
Gasoline	3	0.0	10	698
Subtotal Hayward Library	3	0.0	10	698
Hayward Mayor fleet				
Gasoline	2	0.0	6	403
Subtotal Hayward Mayor fleet	2	0.0	6	403
Hayward Police Department Fleet				
Gasoline	935	9.7	3,543	235,794
Subtotal Hayward Police Department Fleet	935	9.7	3,543	235,794
Hayward Source Control				
Gasoline	19	0.2	70	4,651
Subtotal Hayward Source Control	19	0.2	70	4,651
Hayward Streets Maintenance				
Gasoline	71	0.7	269	18,252
Diesel	50	0.5	187	13,700
Subtotal Hayward Streets Maintenance	121	1.3	456	31,952
Hayward Traffic Maintenance				
Gasoline	18	0.2	68	4,496
Subtotal Hayward Traffic Maintenance	18	0.2	68	4,496

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Government Greenhouse Gas Emissions in 2005
Detailed Report

	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)	Cost ($)
Hayward Trans. Services				
Gasoline	3	0.0	10	670
Subtotal Hayward Trans. Services	3	0.0	10	670
Hayward Utilities				
Gasoline	44	0.5	168	11,302
Diesel	15	0.2	58	4,075
CNG	0	0.0	0	3,300
Subtotal Hayward Utilities	60	0.6	226	18,677
Hayward Waste Management Fleet				
Gasoline	1	0.0	3	0
Diesel	2,227	23.1	8,294	0
CNG	0	0.0	0	0
Subtotal Hayward Waste Management Fleet	2,228	23.1	8,297	0

Data Sources:

1. The City of Hayward does not own or operate the Waste Management Inc. fleet. However, it is included in the emissions inventory because waste hauling is an essential municipal service. This record comprises the portion of fuel consumed by the WM fleet for all service within the city, including the commercial/industrial, residential and government sectors. This particular data entry, the "Hayward Waste Management Fleet" was provided by David Tucker at Waste Management, DTucker2@wm.com on Oct 03, 2006. The record represents the fuel consumed by vehicles of Waste Management Company that are used to manage the waste of the city.

2. Cost data provided by Waste Management, Inc. for gasoline is currently under review by Waste Management staff. ICLEI will provide updated cost data should the numbers need to be revised.

3. CNG data provided by Waste Management, Inc. is currently under review by Waste Management staff. ICLEI will provide updated CNG data should the numbers need to be revised.

Data entered on Aug, 18, 2006 by Palak Joshi, Program Assistant, ICLEI, palak.joshi@iclei.org, (510) 844 0699. Last updated by Jennifer Holzer, Program Associate, ICLEI, July 2008, jennifer.holzer@iclei.org, 510-844-0699.

Hayward Waste Water Fleet				
Gasoline	23	0.2	85	5,393
Diesel	5	0.1	19	998
Subtotal Hayward Waste Water Fleet	28	0.3	104	6,390
Hayward Water Distribution Fleet				
Gasoline	110	1.1	415	27,774
Diesel	48	0.5	179	13,116

This report has been generated for Hayward, CA using STAPPA/ALAPCO and ICLEI's Clean Air and Climate Protection Software developed by Torrie Smith Associates Inc.

Government Greenhouse Gas Emissions in 2005
Detailed Report

	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)	Cost ($)
CNG	0	0.0	0	2,654
Subtotal Hayward Water Distribution Fleet	158	1.6	593	43,544

Data submitted on July, 27, 2006 by Vera Dahle Lacaze, Solid Waste Manager, Hayward City, Vera.Dahle-Lacaze@hayward-ca.gov, (510) 583-4725 with the help of Scott Estes, Equipment Manager, Scott.Estes@hayward-ca.gov <mailto:Scott.Estes@hayward-ca.gov>, (510) 881-7914

Data entered on Aug, 21, 2006 by Palak Joshi, Program Assistant, ICLEI, palak.joshi@iclei.org, (510) 844 0699.

Notes:
1. Vehicles classified into types using the www.fueleconomy.gov.

2.CNG vehicles will be phased out by 2020 and so zero fuel consumption is noted. The projections for 2020 is provided by Scott Estes, Equipment Manager, Hayward.

Subtotal Vehicle Fleet	4,105	42.6	15,391	481,884
Streetlights				
Hayward, CA				
Streetlights				
Electricity	1,122	11.6	5,017	552,000
Subtotal Streetlights	1,122	11.6	5,017	552,000

1. The updated 2005 PG&E CO2e emission factor of 0.49 lbs/kWh of delivered electricity is verified by the California Climate Action Registry and was reported to ICLEI in January 2007 by Greg San Martin. The PG&E CO2e emissions factor of 53.05 kg/MMbtu of delivered natural gas, verified by the California Climate Action Registry and the CEC. The PG&E coefficient set does not have emissions factors for CH4 and N2O as the CO2e emissions factor includes CH4 and N2O emissions in CO2 equivalents. The business-as-usual projections for 2020 assume no change in the PG & E CO_2e emissions factor.

2. Default criteria air pollutant emissions factors are based on the Region 13 - Western Systems Coordinating Council/CNV Average Grid Electricity Set.

Traffic Signals - City Owned				
Electricity	97	1.0	435	74,000
Subtotal Traffic Signals - City Owned	97	1.0	435	74,000
Untitled				
Electricity	224	2.3	1,000	0
Subtotal Untitled	224	2.3	1,000	0
Subtotal Streetlights	1,442	15.0	6,452	626,000

This report has been generated for Hayward, CA using STAPPA/ALAPCO and ICLEI's Clean Air and Climate Protection Software developed by Torrie Smith Associates Inc.

Government Greenhouse Gas Emissions in 2005
Detailed Report

	Equiv CO_2 (tonnes)	Equiv CO_2 (%)	Energy (MWh)	Cost ($)
Water/Sewage				
Hayward, CA				
Hayward Lift Stations				
Electricity	125	1.3	561	151,401
Subtotal Hayward Lift Stations	125	1.3	561	151,401

The record includes energy consumed in the Lift stations only.

1. The updated 2005 PG&E CO2e emission factor of 0.49 lbs/kWh of delivered electricity is verified by the California Climate Action Registry and was reported to ICLEI in January 2007 by Greg San Martin. The PG&E CO2e emissions factor of 53.05 kg/MMbtu of delivered natural gas, verified by the California Climate Action Registry and the CEC. The PG&E coefficient set does not have emissions factors for CH4 and N2O as the CO2e emissions factor includes CH4 and N2O emissions in CO2 equivalents. The business-as-usual projections for 2020 assume no change in the PG & E CO_2e emissions factor.

2. Default criteria air pollutant emissions factors are based on the Region 13 - Western Systems Coordinating Council/CNV Average Grid Electricity Set.

Wastewater Treatment Plant - Hayward				
Electricity	1,056	10.9	4,723	521,000
Natural Gas	156	1.6	855	34,000
Subtotal Wastewater Treatment Plant - Hayward	1212	12.6	5,578	555,000

Current inflow for the treatment plant is 13.5 MGD. The Water Pollution Control Facities (WPCF) produces and uses electricity through bio-methane generation. Hence its consumption is not covered here. Bio-methane is produced by anaerobic digestion process and burned in the co-generation equipment.

Water supply - Hayward				
Electricity	717	7.4	3,208	378,854
Subtotal Water supply - Hayward	717	7.4	3,208	378,854

This record includes energy consumed in pump stations, reservoir, wells, cathodic protection system, PR station, underpass etc.

Subtotal Water/Sewage	2,055	21.3	9,348	1,085,255

Appendix B: Estimated Emissions Reductions

Strategy 1: Transportation and Land Use: Reduce Vehicle Miles Traveled

Overall Strategy 1 Goals

1. Reduce VMT of passenger vehicles to 30 percent below business-as-usual projections by 2050.
2. Reduce VMT of heavy trucks (diesel vehicles) to 10 percent below business-as-usual projections by 2050.

Estimated Annual Emissions Reductions

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Total (community-wide actions implemented and long-term Strategy goals achieved)		**32,859**	**99,174**	**6.2%**	**9.3%**
Community-wide Actions					
Increase the Use of Alternative Modes of Transportation					
Action 1.1	Assist businesses in developing and implementing commuter benefits programs. A commuter benefits program might consist of an offer to provide discounted or subsidized transit passes, emergency ride home programs, participation in commuter rideshare programs, parking cash-out or parking pricing programs, or tax credits for bike commuters.	2,286	8,106	1.5%	0.8%
Action 1.2	Assist businesses in developing and implementing car sharing programs, such as Zip Car® or City Car Share, and encourage large employers such as the colleges and Hayward Unified School District (HUSD) to implement such programs.	416	7,283	0.3%	0.7%
Action 1.3	Modify City parking ordinances to incentivize walking, biking, and public transit by employing parking strategies that include adding bicycle parking, increasing the number of parking spots with time limits, adjusting parking time limits to correspond with adjacent building uses, increasing the number of paid parking spaces, and making space location and fees consistent with demand targets.		9,471	0.0%	0.9%
Improve Effectiveness of Transportation Circulation System					
Action 1.4	Collaborate with BART and AC Transit to explore short- and long-term opportunities to expand services (for example, to extend rapid bus service from Bay Fair to the South Hayward BART Station) and pursue a hydrogen fueling station for both buses and personal vehicle use, improve transit stations by expanding amenities at stations, and improve bus stops by adding benches and shelters.	3,062	15,199	2.0%	1.4%

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Action 1.5	Continue to implement and expand the City-wide bicycle master plan through aggressive pursuit of grants and other sources of funding which could be used to expand bike lanes and bike parking facilities. Assist businesses in creating or expanding bike-to-work incentive programs, including bike sharing, adequate secure bike parking, bike maps of the City, bike safety classes, and other incentives that reward bikers.	2,419	7,610	1.6%	0.7%
Action 1.6	Develop and implement a City-wide pedestrian master plan that improves the convenience, safety, and attractiveness of and access to pedestrian ways. Update the plan on a regular basis to ensure that walkability improves over time.	1,394	7,121	0.9%	0.7%
Action 1.7	Update the City's Circulation Element of the General Plan to locate, evaluate appropriate transit modes such as street car, bus rapid transit, or other modes that eventually decrease the need for personal vehicles for travel within the City. The Plan should integrate pedestrian, bicycles, and transit modes with motor and other vehicles. When proposing changes to the transportation system, the City should consider the climate impacts and give preference to solutions that reduce auto dependency and minimize GHG emissions.	emissions reductions were not quantified			
Action 1.8	Improve traffic flow and reduce vehicle idling by means of synchronized signals, transit and emergency signal priority, and other traffic flow management techniques. When developing the program, Hayward should work with the Metropolitan Transportation Commission and the Alameda County Congestion Management Agency to expand roadway and intersection performance metrics to include pedestrian, bicycle, and level of service criteria to measure quantitative and qualitative metrics such as accessibility, intersection crossing times, and other relevant data. It is recommended that Hayward use evaluation criteria that consider costs and GHG reduction benefits of biking, walking, carpooling, and public transit.	23,061	21,875	14.9%	2.0%
Utilize Zoning & Land-use Mechanisms to Minimize Need for Transportation					
Action 1.9	In order to encourage non-automotive modes of travel, continue to implement and update the General Plan Circulation and Land Use Elements pertaining to smart growth principles that support higher-density, mixed-use, and well-designed development in areas within ½ mile of transit stations and ¼ mile of major bus routes. Amend the Municipal Code Zoning, Subdivision, and Off-Street Parking Standards to incorporate smart growth principles, policies, and development standards consistent with recommendations provided in the Appendix H and I of the CAP.	emissions reductions were not quantified			
Action 1.10	Explore the development of zoning and development standards that consider both the land uses and the urban design and form of buildings and public space, where the new standards will result in reduced GHG emissions.	emissions reductions were not quantified			
Action 1.11	Explore potential strategies related to the creation of additional affordable housing to sell to buyers employed in Hayward but who currently reside in other areas and commute to work in Hayward. For example, consider implementing a community land trust to purchase and resell foreclosed properties. The program could potentially be coordinated with local businesses.	emissions reductions were not quantified			

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Action 1.12	Develop an incentive plan to maximize the number of residents that work within the City, and encourage filling local jobs first with local residents, to eliminate commutes.	emissions reductions were not quantified			
Municipal Actions					
Action 1.13	Reinstate commuter benefits such as Commuter Checks to City employees, and when possible expand or develop other commuter benefits programs such as parking cash-out or parking pricing programs, or taking advantage of the new tax credit for biking to work. The City will amend Administrative Rule 2.26 to reflect current transportation demand management opportunities.	emissions reductions were not quantified			
Action 1.14	Explore options in developing a car-sharing and/or bike sharing program for City employees. If private organizations like Zip Car are not interested in managing the car sharing program, it could be administered by the City as a benefit available to City employees only. A bike share program would also be administered by the City as a benefit to City employees.	emissions reductions were not quantified			
Action 1.15	When making decisions about where to rent or build new City facilities, give preference to locations that are accessible to an existing public transit line.	emissions reductions were not quantified			

(a) Annual estimated emissions reductions assume that program goals, which are presented in Appendix C, are achieved. Assumes Scenario 2 business- as-usual projections for fleet-average fuel economy and renewable energy generation

(b) Assuming Scenario 2 business-as-usual projections, Hayward needs to reduce community-wide emissions by 154,652 and 1,070,189 metric tons annually in 2020 and 2050, respectively.

Strategy 2: Transportation: Decrease the Carbon-Intensity of Vehicles

Overall Strategy 2 Goals

1. Increase fleet average fuel economy of passenger vehicles to 75 mpg by 2050, or achieve equivalent per mile emissions reductions using alternative vehicle technologies.
2. Increase fleet average fuel economy of heavy trucks to 11.5 mpg by 2050, or achieve equivalent per mile emissions reductions using alternative vehicle technologies.

Estimated Annual Emissions Reductions

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Total (community-wide actions implemented and long-term Strategy goals achieved)		**129,060**	**532,735**	**83.5%**	**49.8%**
Community-wide Actions					
Action 2.1	Play an active role in collaborating with regional, state, and federal efforts to provide financial and non-financial incentives for residents to purchase low-carbon vehicles. For example, the City could host work sessions with regional transportation planners and policy makers, or the City may support pending legislation. They City could consider granting designated vehicles access to preferred parking spaces.	129,060	532,735	83.5%	49.8%
Action 2.2	Plan an active role in collaborating with regional, state, and federal entities to promote the use of alternative fuels and increased vehicle fuel efficiency standards. For example, Hayward may advocate for higher fuel-economy standards, or contribute to regional and state marketing and outreach efforts.	129,060	532,735	83.5%	49.8%
Municipal Actions					
Action 2.3	Continue to procure fuel-efficient and alternative fuel vehicles for municipal vehicle fleet.	54.28	108.23	5.3%	1.2%
Action 2.4	Continue to, whenever possible, negotiate an alternative fuel requirement into new services provided by the City's franchisee.	54.28	108.23	5.3%	1.2%

(a) Annual estimated emissions reductions assume that program goals, which are presented in Appendix C, are achieved. Assumes Scenario 2 business-as-usual projections for fleet-average fuel economy and renewable energy generation

(b) Assuming Scenario 2 business-as-usual projections, Hayward needs to reduce community-wide emissions by 154,652 and 1,070,189 metric tons annually in 2020 and 2050, respectively.

Strategy 3: Energy: Improve Energy Performance of Existing Buildings

Overall Strategy 3 Goals

1. Reduce electricity consumption in buildings constructed before the Green Building Ordinance took effect to 65 percent below business-as-usual projects by 2050.
2. Reduce natural gas consumption in buildings constructed before the Green Building Ordinance took effect to 50 percent below business-as-usual projects by 2050.

Estimated Annual Emissions Reductions

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Total (community-wide actions implemented and long-term Strategy goals achieved)		**8,723**	**205,890**	**5.6%**	**19.2%**
Community-wide Actions					
Action 3.1	Develop and implement a Residential Energy Conservation Ordinance (RECO) for detached single-family homes which would require improved energy efficiency and energy conservation in residential buildings. Update the RECO on a regular basis to ensure buildings become more energy efficient over time. Typical energy efficiency improvements may include updates to the lighting, heating, ventilation, and air conditioning systems and improvements that lead to water conservation.	639	39,304	0.4%	3.7%
Action 3.2	Develop and implement a Residential Energy Conservation Ordinance (RECO) for multiple-unit homes which would require improved energy efficiency and energy conservation in residential buildings. Update the RECO on a regular basis to ensure buildings become more energy efficient over time. Typical energy efficiency improvements may include updates to the lighting, heating, ventilation, and air conditioning systems and improvements that lead to water conservation.	983	33,033	0.6%	3.1%
Action 3.3	Develop a Commercial Energy Conservation Ordinance (CECO) which would require improved energy efficiency and energy conservation in commercial buildings. Continuously update the CECO to ensure buildings become more energy efficient over time. Typical energy efficiency improvements may include updates to the lighting, heating, ventilation, and air conditioning systems and improvements that lead to water conservation.	5,164	105,152	3.3%	9.8%
Action 3.4	Actively participate in local low-income weatherization initiatives with the goal of weatherizing all qualifying low-income homes in Hayward.	emissions reductions were not quantified			
Action 3.5	Develop public information and education campaign to encourage every household and every business to reduce their energy consumption by 10 percent over ten years.	emissions reductions were not quantified			
Action 3.6	Develop a program to encourage or require installation of Home Energy Monitors in existing residences. Home Energy Monitors monitor energy use and provide building occupants with feedback on their real-time and long-term average energy consumption. This may be done in conjunction with Actions 3.1, 3.2, or 3.4 or 3.5.	emissions reductions were not quantified			

Action 3.7	Develop a residential energy efficiency retrofit financing program for single unit homes.	181	40,248	0.1%	3.8%
Action 3.8	Develop a residential energy efficiency retrofit financing program for multiple unit homes.	126	33,617	0.1%	3.1%
Action 3.9	Develop a commercial energy efficiency retrofit financing program.	1,630	132,025	1.1%	12.3%
Municipal Actions					
Action 3.10	Take advantage of California Energy Commission's low interest loans for efficiency retrofits and LED street lighting (http://www.energy.ca.gov/efficiency/financing)	969	1054	93.7%	11.3%
Action 3.11	Continue to implement energy conservation practices in City-owned buildings. Prepare an energy conservation plan and update it on a regular basis.	330	1542	31.9%	16.5%
Action 3.12	Improve energy performance of City buildings. Begin by auditing city buildings to identify opportunities for efficiency improvements from both operations and equipment upgrades.	330	1542	31.9%	16.5%

(a) Annual estimated emissions reductions assume that program goals, which are presented in Appendix C, are achieved. Assumes Scenario 2 business-as-usual projections for fleet-average fuel economy and renewable energy generation

(b) Assuming Scenario 2 business-as-usual projections, Hayward needs to reduce community-wide emissions by 154,652 and 1,070,189 metric tons annually in 2020 and 2050, respectively.

Strategy 4: Energy: Improve Energy Performance of New Buildings

Overall Strategy 4 Goal

1. Buildings constructed after 2030 will be carbon-neutral.

Estimated Annual Emissions Reductions

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Total (community-wide actions implemented and long-term Strategy goals achieved)		**5,472**	**96,761**	**3.5%**	**9.0%**
Community-wide Actions					
Action 4.1	Continue to implement the Private Development Green Building Ordinance for residential buildings. Evaluate the program on a regular basis to ensure new buildings are getting more efficient over time.	979	18,836	0.6%	1.8%
Action 4.2	Continue to implement the Private Development Green Building Ordinance for commercial and industrial buildings. Evaluate the program on a regular basis to ensure new buildings are getting more efficient over time.	4,493	77,925	2.9%	7.3%
Municipal Actions					
Action 4.3	Continue to implement the Municipal Green Building Ordinance. Evaluate the program every 5 years to ensure buildings are becoming more efficient over time.	46.59	328.37	4.5%	3.5%

(a) Annual estimated emissions reductions assume that program goals, which are presented in Appendix C, are achieved. Assumes Scenario 2 business-as-usual projections for fleet-average fuel economy and renewable energy generation
(b) Assuming Scenario 2 business-as-usual projections, Hayward needs to reduce community-wide emissions by 154,652 and 1,070,189 metric tons annually in 2020 and 2050, respectively.

Strategy 5: Energy: Use Renewable Energy

Overall Strategy 5 Goal

1. 100 percent renewable electricity generation by 2050

Estimated Annual Emissions Reductions

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Total (community-wide actions implemented and long-term Strategy goals achieved)		**14,598**	**80,409**	**9.4%**	**7.5%**
Community-wide Actions					
Action 5.1	Develop a program for the financing and installation of photovoltaic renewable energy systems on residential building including single and multiple family residential buildings and mobile homes. Set a target for total MW to be installed.	850	2,149	0.5%	0.2%
Action 5.2	Develop a program for the financing and installation of photovoltaic renewable energy systems on commercial buildings. Set a target for total MW to be installed.	10,768	22,822	7.0%	2.1%
Action 5.3	Incorporate a renewable energy requirement into Private Development Green Building Ordinance.	2,980	24,660	1.9%	2.3%
Action 5.4	Increase the renewable portion of utility electricity generation by advocating for increased state-wide renewable portfolio standards; and consider participating in community choice aggregation, or other means.		30,779	0.0%	2.9%
Municipal Actions					
Action 5.5	Conduct a city-wide renewable energy assessment to estimate the total renewable energy potential and costs and benefits of developing that potential within City bounds. Develop a plan for capturing all cost-effective opportunities.	76.4	2,226	7.4%	23.8%
Action 5.6	Ensure that all new City owned facilities are built with PV and/or solar hot water systems as appropriate to their functions.	76.4	2,226	7.4%	23.8%

(a) Annual estimated emissions reductions assume that program goals, which are presented in Appendix C, are achieved. Assumes Scenario 2 business-as-usual projections for fleet-average fuel economy and renewable energy generation

(b) Assuming Scenario 2 business-as-usual projections, Hayward needs to reduce community-wide emissions by 154,652 and 1,070,189 metric tons annually in 2020 and 2050, respectively.

Strategy 6: Solid Waste: Increase Waste Reduction and Recycling

Overall Strategy 6 Goal

1. Eliminate emissions associated with methane emissions from solid-waste management by 2050.

Estimated Annual Emissions Reductions

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Total (community-wide actions implemented and long-term Strategy goals achieved)		**21,851**	**68,798**	**14.1%**	**6.4%**
Community-wide Actions					
Action 6.1	Increase participation in existing commercial recycling services by hiring a consultant to contact businesses to offer assistance in implementing waste reduction and recycling programs or expanding current programs.	15,916	38,216	10.3%	3.6%
Action 6.2	Continue to implement and promote food scraps collection for single-family homes. Over time, expand food-scraps collection programs with the goal of minimizing organic waste in the landfill.	1,495	11,963	1.0%	1.1%
Action 6.3	Improve the City's construction and demolition debris recycling ordinance by evaluating other jurisdictions' provisions, as well as the processing capabilities of the various transfer stations and facilities in Alameda County and adjacent counties.	1,953	15,634	1.3%	1.5%
Action 6.4	Evaluate the viability of implementing a ban on certain materials from landfill, e.g., yard trimmings, untreated wood, cardboard, plastic bags, or polystyrene.	2,487	2,986	1.6%	0.3%
Action 6.5	Evaluate the viability of requiring that residents and/or businesses participate in the recycling programs offered through the City's franchisee.	emissions reductions were not quantified			
Action 6.6	Develop program that encourages overall reduction of waste in residential and commercial sectors. This would include increasing participation in recycling services at multi-family properties and to eventually make recycling by commercial businesses mandatory.	253	304	0.2%	0.0%
Action 6.7	Advocate for waste management strategies that aim to maximize the useful value of solid waste by, for example, utilizing landfill gas to create electricity.	emissions reductions were not quantified			
Municipal Actions					
Action 6.8	Continue to implement recycling programs in City-occupied buildings.	31.86	70.94	3.1%	0.8%
Action 6.9	Implement organics collection programs in City-occupied buildings.	73.34	163.3	7.1%	1.7%
Action 6.10	Develop an Environmentally Friendly Purchasing Policy.	emissions reductions were not quantified			

(a) Annual estimated emissions reductions assume that program goals, which are presented in Appendix C, are achieved. Assumes Scenario 2 business-as-usual projections for fleet-average fuel economy and renewable energy generation
(b) Assuming Scenario 2 business-as-usual projections, Hayward needs to reduce community-wide emissions by 154,652 and 1,070,189 metric tons annually in 2020 and 2050, respectively.

Strategy 7: Sequester Carbon

Overall Strategy 7 Goal

1. Plant 10,500 trees by 2030

Estimated Annual Emissions Reductions

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Total (community-wide actions implemented and long-term Strategy goals achieved)			**284**	**0.0%**	**0.0%**
Community-wide Actions					
Action 7.1	Develop and implement a program to maximize carbon sequestration activities occurring within Hayward. Activities may include planting trees or managing wetlands.	0	284	0.0%	0.0%
Municipal Actions					
Action 7.2	Develop a protocol for maximizing carbon sequestration on municipal property by way of planning trees or other methods.	5.4	32.4	0.5%	0.3%

(a) Annual estimated emissions reductions assume that program goals, which are presented in Appendix C, are achieved. Assumes Scenario 2 business-as-usual projections for fleet-average fuel economy and renewable energy generation
(b) Assuming Scenario 2 business-as-usual projections, Hayward needs to reduce community-wide emissions by 154,652 and 1,070,189 metric tons annually in 2020 and 2050, respectively.

Strategy 8: Climate Change Adaptation

Overall Strategy 8 Goal

1. No goals established

Estimated Annual Emissions Reductions

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Total (community-wide actions implemented and long-term Strategy goals achieved)		**N/A**	**N/A**	**N/A**	**N/A**
Community-wide Actions					
Action 8.1	PLACE HOLDER - ACTIONS NOT DEFINED				
Municipal Actions					
Action 8.2	PLACE HOLDER - ACTIONS NOT DEFINED				

(a) Annual estimated emissions reductions assume that program goals, which are presented in Appendix C, are achieved. Assumes Scenario 2 business-as-usual projections for fleet-average fuel economy and renewable energy generation

(b) Assuming Scenario 2 business-as-usual projections, Hayward needs to reduce community-wide emissions by 154,652 and 1,070,189 metric tons annually in 2020 and 2050, respectively.

Strategy 9: Engage and Educate Community

Overall Strategy 9 Goal

1. No specific goals defined

Estimated Annual Emissions Reductions

Action Number	Full Description	Estimated Annual Emissions Reductions (a) (metric tons CO2e)		Percent contribution to target reductions (b)	
		2020	2050	2020	2050
Total (community-wide actions implemented and long-term Strategy goals achieved)		**emissions reductions were not quantified**			
Community-wide Actions					
Action 9.1	Create a stand-alone Green Portal, or website, that would serve as the City's hub for all things green. The site would contain a dedicated area for green building, all programs related to the climate action plan, and information about local green jobs and training. The portal will ensure that all residents and businesses have access to information on the City's climate-related initiatives.	emissions reductions were not quantified			
Action 9.2	Develop and implement a plan that aims to engage residents in the City-wide effort to reduce emissions. The plan will be designed to reach residents of all ages, races, and classes on how to reduce GHG emissions and will introduce residents to City climate action programs. This plan will incorporate a long-term plan to involve K-12 schools and universities and utilize the most effective means of engaging the broader community.	emissions reductions were not quantified			
Action 9.3	Develop and implement an outreach plan to engage local businesses in climate-related programs. This program should provide a benefit for both local government and businesses: the City, will aim to provide businesses with information on local, state, and federal programs, and businesses should be given the opportunity to provide input on ways local government could help streamline their efforts to reduce emissions. In developing this plan, the City will explore options for engaging the Chamber of Commerce, the Keep Hayward Clean and Green Taskforce, the Alameda County Green Business Program, and other business councils.	emissions reductions were not quantified			
Municipal Actions					
Action 9.4	Offer a GHG reductions education program in which employees will learn about programs the City already offers or will offer in the future to residents and businesses.	emissions reductions were not quantified			
Action 9.5	Show leadership by setting targets to reduce municipal emissions and work diligently to meet targets.	emissions reductions were not quantified			

Action 9.6	When awarding contracts, professional service agreements, grants, etc. to businesses or non-profit agencies, the City will request proposals or applications to include information about the sustainability practices of the organization.	emissions reductions were not quantified
(a) Annual estimated emissions reductions assume that program goals, which are presented in Appendix C, are achieved. Assumes Scenario 2 business-as-usual projections for fleet-average fuel economy and renewable energy generation (b) Assuming Scenario 2 business-as-usual projections, Hayward needs to reduce community-wide emissions by 154,652 and 1,070,189 metric tons annually in 2020 and 2050, respectively.		

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Appendix C: Methodology Report: Calculation of Estimated Emissions Reductions

This appendix explains methodology used to determine estimated emissions reductions from strategies and actions proposed in the Climate Action Plan. Strategy specific definitions are included when necessary in order to ensure accurate description and interpretation. The Climate Action Plan includes many actions which will collectively allow the City to achieve its overall emissions reduction target.

The Climate Action Plan covers a range of 40 years, which is a very long planning horizon. Therefore, calculations and forecasts are subject to error due to potential unforeseen factors which may arise in the future. However, every effort has been made to create realistic recommendations based on data which is currently available.

It is essential to recognize that each action has associated program goals.. The CAP includes recommended program goals that HDR believes are reasonable to achieve., Some examples of program goals include targeted percentage reduction in number of single occupancy vehicles, or goals for percentage of citizens participating in a program. When designing programs, City staff should keep program goals in mind and work to design programs so that program goals are achieved or exceeded.

Most actions include multiple phases. A phased-in approach is used to calculate emission reductions in order to account for potential legislative or technological changes which may take place in the future and due to the assumption that the goals of a program may change in the future.

Hayward opted to adopt state-wide emissions reductions goals. State-wide emission targets are based on a 1990 baseline but Hayward's inventory uses a 2005 baseline. To address the difference in the state and City baseline years, the City calculated what the state goals would be if they were calculated from a 2005 baseline and found that the targets would to reduce emissions to be 12.5 percent below the 2005 level by 2020 and 83 percent below the 2005 level by 2050 (as compared to matching 1990 levels by 2020 and 80 percent below 1990 levels by 2050). Phrasing the target based on 2005 emissions levels does not change the targeted quantity of emissions; specifically California's goal is for emissions to be no more than 85.3 million metric tons CO_2e in 2050. This is equivalent to 80 percent below the 1990 emissions (427 million metric tons CO_2e) or 82.5 percent below the 2005 emissions (480 million metric tons CO_2e).

Strategy 1

Overall Strategy 1 Goals

1. Reduce VMT of passenger vehicles to 30 percent below business-as-usual projections by 2050.
2. Reduce VMT of heavy trucks (diesel vehicles) to 10 percent below business-as-usual projections by 2050.

Strategy 1 Definitions

- Commuter – based on definition used by MTC, a commuter is quantified by counting any person entering or leaving Hayward. The calculation does not include through traffic. The source of commuter data was the Census Transportation Planning Package; Complete data is available at: ftp://ftp.abag.ca.gov/pub/mtc/census2000/CTPP/flowdata/CTPP2000_California_PlaceFlow_SelVars.zip For more information about the Census Transportation Planning Package go to: http://www.mtc.ca.gov/datamart/census/ctpp2000/

- New Commuter – is calculated based on growth in total number of commuters by using demographic projections of population growth from ABAG. Growth factors are presented in Section 2 of the Plan.
- SOV – single occupancy vehicle; individual traveling alone in vehicle without other passengers.
- "Commuters switching from SOV" - implies that a given number of single occupancy vehicles have been removed from the road completely. Data from MTC, fuel economy and a fuel emissions factor were used to calculated emissions reductions achieved by taking one SOV off the road.

Assumptions Applicable to Every Action within Strategy 1

- The CAP only attempts to quantify the emissions impacts of commuter mode shifts. It does not attempt to quantify emissions impacts of reduced personal travel.
- The Emissions reductions quantified in the analyses below do not result in enough savings to achieve the overall goal of reducing VMT in passenger vehicles to 30 percent below BAU projections.
- The CAP does not identify opportunities to reduce VMT of heavy trucks.
- The business-as-usual assumption is that the average fuel economy of all gasoline-powered vehicles traveling on Hayward's roadways will increase to 25 mpg by 2020 and 45 mpg by 2050. This assumption takes into account pending increases in CAFE standards and assumes that over time, as individuals replace older cars with newer more full-efficient cars, the average fuel economy for the entire fleet of cars driving on Hayward's roadways will increase (see Section 2 of the CAP)
- Unless noted otherwise, it is assumed that the round-trip commute distance is 27 miles per day. This value was calculated using MTC's commuter census data from the 2000 census year. Based on the assumption that the average commuter travels 250 days per year (50 weeks/yr x 5 days/week = 250 days/year) then the average commuter traveled 6083 miles/year (27 miles/day x 250 days/year = 6083 miles/ear).
- An emissions factor of 9.04 metric tons of CO_2e per 1000 gallons of gasoline burned in gasoline-powered vehicles. This emissions factor takes into account the mix of gasoline-powered vehicles that travel on Hayward's roadways and was calculated by ICLEI. . Emissions factors are used to calculate total emissions and reductions.
- An emissions factor of 9.88 metric tons of CO_2e per 1000 gallons of diesel burned in diesel-powered vehicles. This emissions factor takes into account the mix of gasoline-powered vehicles that travel on Hayward's roadways and was calculated by ICLEI. . Emissions factors are used to calculate total emissions and reductions.
- Program goals are assumed to be achieved by the end of each phase.
- Emissions savings from diesel-powered vehicles are not include in estimated emissions savings that result in a reduction in the number of commuters traveling in single occupancy vehicles (SOVs). This assumption is justified by the fact that a vast majority of vehicles used for commuting purposes are gasoline-powered vehicles, not diesel-powered vehicles. So any reduction in diesel consumption from reducing number of SOV commuters is minimal and statistically insignificant. It is assumed that a reduction in SOV travel leads to a reduction in gasoline consumption due to the fact that most personal vehicles are gasoline powered.
- The emissions impacts of expanded transit to accommodate increased ridership were not evaluated.

Action 1.1 – Assist businesses in providing commuter benefits programs

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** (2012 – 2017) – The goal of the first phase of this program is to switch 5% of new commuters from SOV to alternative forms of transit.
- **Phase 2** (2018 – 2050) – The goal of the second phase of this program is to switch 8% of new commuters from SOV to alternative forms of transit.

Program Impacts

- By the end of phase 1, the total number of commuters is expected to increase from 110,291 to 118,864, which represents an addition of 8,600 new commuters. Phase 1 of the program is expected to switch 5% of these 8,574 new commuters to alternative forms of transit which will result in 429 SOV commuters switching to a different mode of transit and lead to an estimated annual emissions savings of 1,121 metric tons of CO_2e by the end of the first phase.
- By the end of phase 2, the total number of commuters is expected to increase from 118,864 to 194,819, which represents an addition of 75,955 new commuters. By the end of phase 2, the goal is to get 8% of these new commuters to use alternative forms of transit which will result in 5,500 SOV commuters switching to a different mode of transit and lead to an estimated annual emissions savings of 7,520 metric tons of CO_2e by the end of the second phase.

Action 1.2 – Establish car share / bike share program

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** – (2015 – 2020) The goal is to switch 2% of new commuters from SOV to alternative forms of transit by the end of the phase.
- **Phase 2** – (2021 – 2050) The goal is to switch 8% of new commuters from SOV to alternative forms of transit by the end of the phase.

Program Impacts

- By the end of phase 1, the total number of commuters is expected to increase from 115,358 to 124,325, which represents an addition of 8,967 new commuters. If program goals are achieved, 2% of these new commuters to alternative forms of transit which will result in removing 179 SOVs from the road and lead to an estimated annual emissions savings of 416 metric tons of CO_2e by the end of the first phase (in 2020). It is assumed that by the end of phase 1, there will be 9 car-share vehicles will be available and the average fuel economy of the car-share vehicle would be 40 mpg
- By the end of phase 2, the total number of commuters is expected to increase from 126,200 to 194,819, which represents an addition of 68,619 new commuters. Phase 2 of the program is expected to switch 8% of new commuters to alternative forms of transit which will result in removing 6,218 SOVs from the road and leads to an estimated annual emissions savings of 7,062metric tons of CO_2e by the end of the second phase. It is assumed that during phase 274 car share vehicles will be available and the average fuel economy of the car-share vehicle would be 65 mpg.

Action 1.3 – Update parking policies to encourage reduction in vehicle travel

It is assumed that residents will use transit, walk, ride bikes, or carpool to locations within Hayward therefore the program will only reduce fuel consumption on local roads. It is also assumed that a reduction in VMT is from gasoline-powered vehicles since most personal vehicles are gasoline-powered.

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** (2025 – 2030) – The goal of the first phase of this program is a reduction of 1% of vehicle miles traveled on local roads.
- **Phase 2** (2031 – 2050) – The goal of the second phase of this program is a reduction of 5% of vehicle miles traveled on local roads.

Program Impacts

- Without a program, the projected business-as-usual VMT on local roads for the year Phase 1 ends is 699,023,072. Phase 1 of the program is expected to reduce 1% of local VMT which occur during this phase and which lead to an estimated annual emissions savings of 1,995 metric tons of CO_2e by the end of the first phase.
- Without a program, the projected business-as-usual VMT on local roads for the year Phase 2 ends is 943,062,433. Phase 2 of the program is expected to reduce 5% of local VMT which occur during this phase and which lead to an estimated annual emissions savings of 8,067 metric tons of CO_2e by the end of the second phase.

Action 1.4 – Expand transit services to encourage reduction in vehicle travel

Action-specific Assumptions

It is assumed that that there will be coordination and cooperation at the county and regional level.

Program Goals

- **Phase 1** (2012 – 2017) – The goal of the first phase of this program is to switch 3% of new commuters from SOV to alternative forms of transit.
- **Phase 2** (2018 – 2050) – The goal of the second phase of this program is to switch 15% of new commuters from SOV to alternative forms of transit.

Program Impacts

- By the end of phase 1, the total number of commuters is expected to increase from 110,291 to 118,864, which represents an addition of 8,574 new commuters. Phase 1 of the program is expected to switch 3% of new commuters to alternative forms of transit which will result in removing 257 SOVs from the road and will lead to an estimated annual emissions savings of 672 metric tons of CO_2e by the end of the first phase.
- By the end of phase 2, the total number of commuters is expected to increase from 120,657 to 194,819, which represents an addition of 74,162 new commuters. Phase 2 of the program is expected to switch 15% of new commuters to alternative forms of transit which will result in removing 11,124 SOVs from the road and will lead to an estimated annual emissions savings of 14,848 metric tons of CO_2e by the end of the second phase.

Action 1.5 – Continue to implement bike master-plan

Action-specific Assumptions

Average trip length for a walking commuter is 6.5 miles. This was estimated using MTC commute census data. So the annual reduction in VMT from commuters switching from SOV to walking is equal to 1625 miles (6.5 miles per trip x 2 trips per day x 250 days per year = 3,250 miles per commuter per year).

Program Goals

- **Phase 1** (2008 – 2015) – The goal of the first phase of this program is to switch 4% of new commuters from SOV to alternative forms of transit.
- **Phase 2** (2016 – 2050) – The goal of the second phase of this program is to switch 15% of new commuters from SOV to alternative forms of transit.

Program Impacts

- By the end of phase 1, the total number of commuters is expected to increase from 103,875 to 115,358, which represents an addition of 11,478 new commuters. Phase 1 of the program is expected to switch 4% of new commuters to alternative forms of transit which will result in removing 459 SOVs from the road and will lead to an estimated annual emissions savings of 598 metric tons of CO_2e by the end of the first phase.
- By the end of phase 2, the total number of commuters is expected to increase from 117,098 to 194,819, which represents an addition of 77,721 new commuters. Phase 2 of t_he program is expected to switch 15% of new commuters to alternative forms of transit which will result in removing 11,658 SOVs from the road and will lead to an estimated annual emissions savings of 7,310 metric tons of CO_2e by the end of the second phase.

Action 1.6 – Develop and implement pedestrian master-plan

Action-specific Assumptions

Average trip length for a walking commuter is 3.25 miles. This was estimated using MTC commute census data. So the annual reduction in VMT from commuters switching from SOV to walking is equal to 1625 miles (3.25 miles per trip x 2 trips per day x 250 days per year = 1,625 miles per commuter per year).

Program Goals

- **Phase 1** (2012 – 2017) – The goal of the first phase of this program is to switch 5% of new commuters from SOV to alternative forms of transit.
- **Phase 2** (2018 – 2050) – The goal of the second phase of this program is to switch 15% of new commuters from SOV to alternative forms of transit.

Program Impacts

- By the end of phase 1, the total number of commuters is expected to increase from 110,291 to 118,864, which represents an addition of 8,574 new commuters. Phase 1 of the program is expected to switch 5% of new commuters to alternative forms of transit which will result in removing 429 SOVs from the road and will lead to an estimated annual emissions savings of 268 metric tons of CO_2e by the end of the first phase.
- By the end of phase 2, the total number of commuters is expected to increase from 120,657 to 194,819, which represents an addition of 74,162 new commuters. Phase 2 of the program is expected to switch 15% of new commuters to alternative forms of transit which will result in removing 11,124 SOVs from the road and will lead to an estimated annual emissions savings of 6,981 metric tons of CO_2e by the end of the second phase.

Action 1.7 – Evaluate expansions of appropriate modes of transit

Direct emissions savings are not accounted for in Action 7 in order to avoid double counting since emissions savings will be captured in other Strategy 1 actions.

Action 1.8 – Prioritize traffic-flow management practices to reduce idling time

Action-specific Assumptions

There is only one phase of this project due to the fact that it relies upon a one-time installation of equipment. The program results in the reduction of idling which leads to a decrease in fuel consumption. Both diesel and gasoline powered vehicle emissions are included in this calculation because all projected gasoline consumption is based on MTC forecasted growth.

Program Goal

- **Phase 1** (2015 – 2018) – The goal of this program is to reduce gasoline and fuel consumption by 1%.

Program Impacts

- After implementing this program total gasoline and diesel consumption is expected to decrease by about 1%. The annual reduction in gasoline and diesel consumption in 2018 is estimated to be 24.1 million gallons and 67,600 gallons, respectively. Preventing this fuel from being combusted is expected to reduce GHG emissions by 23,152 metric tons CO_2e in 2018.

Actions 1.9 – Require high-density, mixed-use, smart-growth development

GHG savings from these actions are not calculated or evaluated due to lack of sufficient data.

Actions 1.10 – Increase availability of affordable employee housing

GHG savings from these actions are not calculated or evaluated due to lack of sufficient data.

Action 1.11 – Increase availability of affordable employee housing

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** (2015 – 2020) – The goal of the first phase of this program is to switch 1% of new commuters from SOV to alternative forms of transit.
- **Phase 2** (2021 – 2050) – The goal of the second phase of this program is to switch 4% of new commuters from SOV to alternative forms of transit.

Program Impacts

- By the end of phase 1, the total number of commuters is expected to increase from 115,358 to 124,325, which represents an addition of 8,967 new commuters. Phase 1 of the program is expected to switch 1% of new commuters to alternative forms of transit which will result in removing 90 SOVs from the road and will lead to an estimated emissions annual savings of 221 metric tons of CO_2e by the end of the first phase.
- By the end of phase 2, the total number of commuters is expected to increase from 126,200to 194,819, which represents an addition of 68,619 new commuters. Phase 2 of the program is expected to switch 4% of new commuters to alternative forms of transit which will result in removing 2,655 SOVs from the road and will lead to an estimated emissions annual savings of 3,628 metric tons of CO_2e by the end of the second phase.

Strategy 2

Overall Strategy 2 Goals

1. Increase fleet average fuel economy of passenger vehicles to 75 mpg by 2050, or achieve equivalent per mile emissions reductions using alternative vehicle technologies.
2. Increase fleet average fuel economy of heavy trucks to 11.5 mpg by 2050, or achieve equivalent per mile emissions reductions using alternative vehicle technologies.

Strategy 2 Definitions

Definitions for Strategy 1 are applicable to Strategy 2.

Assumptions Applicable to Every Action within Strategy 2

It is assumed that fuel economy in Hayward is going to be higher than the national average because programs in this strategy incentivize Hayward residents to purchase fuel efficient vehicles which will result in Hayward's average fuel economy to raise above the overall average fuel economy. Emissions savings are calculated for the entire strategy rather than individual actions.

Actions 2.1 – Provide incentives for low-carbon vehicles and low-carbon fuels

Action 2.2 – Collaborate the state and federal government on policies that promote low-carbon vehicles and low-carbon fuels.

Action-specific Assumptions

The impacts of actions 1 and 2 were calculated together.

Program Goals

- **Phase 1** – (2010 – 2020) The goal of the first phase of this program is to increase the average fuel economy of Hayward's local fleet to 30 mpg for gasoline powered vehicles and 7 mpg for diesel powered vehicles.
- **Phase 2** – (2021 – 2050) The goal of the second phase of this program is to increase the average fuel economy of Hayward's local fleet to 60 mpg for gasoline powered vehicles and 9.5 mpg for diesel powered vehicles.

Program Impacts

- Without implementing any programs in this strategy, at the end of phase 1 Hayward's average fuel economy is expected to be 25 MPG and 6.8 MPG for gasoline and diesel vehicles, respectively. In 2020, projected gasoline consumption (using the BAU fuel economy of 25 MPG) is expected to be about 61.6 million gallons per year. Implementing programs in this area will allow for a reduction in gasoline consumption to 51.3 million gallons which is a savings of about 10.3 million gallons. Reduced gasoline and diesel use is estimated to result in 97,734 metric tons of CO_2e savings in 2020.
- Without implementing any programs in this strategy at the end of phase 2, Hayward's average fuel economy is expected to be 40 MPG and 9.0 MPG for gasoline and diesel vehicles, respectively. In 2050, projected gasoline consumption (using the BAU fuel economy of 40 MPG) is expected to be 53.6 million gallons per year. Implementing programs in this area will allow for a reduction in gasoline consumption to 48.3 million gallons which is a savings of 5.4 million gallons. Reduced gasoline and diesel use is estimated to result in 70,744 metric tons of CO_2e savings in 2050.

Strategy 3

Overall Strategy 3 Goals

1. Reduce electricity consumption in buildings constructed before the Green Building Ordinance took effect to 65 percent below business-as-usual projections by 2050.
2. Reduce natural gas consumption in buildings constructed before the Green Building Ordinance took effect to 50 percent below business-as-usual projections by 2050.

Strategy 3 Definitions

Renewable energy – energy derived from natural resources that are naturally replenished. Such resources include, sun, wind, tidal currents, and geothermal heat.

Assumptions Applicable to Every Action within Strategy 3

- For all actions within Strategy 3, the data source for electricity consumption is PG&E.
- Emissions factor of electricity supplied from the local utility changes over time because the sources of electricity generation change over time. It is assumed that in 33 percent of the electricity supplied from the local utility in 2020 will be generated using renewable sources, and that 40 percent of the electricity supplied from the local utility in 2050 will be generated using renewable source (see Section 2 of the CAP).
- It is assume that electricity generated from renewable sources does not emit any GHG emissions (emission factor = 0 tons CO_2e/MWh)
- This action only quantifies reductions for existing building stock since any new construction will be subject to the new green building ordinance.

Action 3.1 – Develop and implement residential energy conservation ordinance (RECO) for single-family homes

Action-specific Assumptions

It was estimated that there were 27,801 single-unit residential buildings in Hayward before the Green Building Ordinance took effect. This value was estimated using ABAG projections. Mobile homes are not included in the calculation.

Potential natural gas and electricity savings were estimated based on outcomes from Lawrence Berkley National Laboratory's Home Energy Saver calculator.[117] The model estimates that it is possible to achieve 19.5% energy savings and 56% natural gas savings in a building constructed in Hayward in 1960. For this calculation, it is assumed that these savings would not be achieved, but these savings were used for guidance in developing the program goals.

Program Goals

- **Phase 1** (2012 – 2017) – The goal of the first phase is to reduce electricity use by 1% and reduce natural gas use by 2.5% in participating single-unit homes. The goal is to get 12.5 % of residential units that were constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.
- **Phase 2** (2018 – 2030) – The goal of the second phase of this program is to reduce electricity and natural gas use by 20% in participating single-unit homes. The goal is to get 45 % of residential units that were

[117] http://hes3.lbl.gov/hes/ZipCarbon.taf?f=ZipCarbon&session_id=1252964

constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.

- **Phase 3** (2031 – 2050) – The goal of the third phase of this program is to reduce electricity use by 100% and reduce natural gas use by 75% in participating single-unit homes. The goal is to get 100 % of residential units that were constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.

Program Impacts

- During Phase 1, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 17.27 MMBTU per unit. Projected electricity savings are 606 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 40.03 MMBTU per unit. Projected natural gas savings are 3,567 MMBTU. The estimated annual emissions savings is 223 metric tons of CO_2e by the end of the first phase.
- During Phase 2, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 13.95 MMBTU per unit. Projected electricity savings are 12,728 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 32.84 MMBTU per unit. Projected natural gas savings are 32,101 MMBTU. The estimated annual emissions savings is 2,330 metric tons of CO_2e by the end of the second phase.
- During Phase 3, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 0.0 MMBTU per unit. Projected electricity savings are 279,405 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 10.26 MMBTU per unit. Projected natural gas savings are 502,922MMBTU. The estimated annual emissions savings is 39,377 metric tons of CO_2e by the end of the third phase.

Action 3.2 – Develop and implement residential energy conservation ordinance (RECO) for multiple-family homes

Action-specific Assumptions

It was estimated that there were 18,171 multiple-unit residential buildings in Hayward in 2008. This value was estimated using ABAG projections. Mobile homes are not included in the calculation.

Potential natural gas and electricity savings were estimated based on outcomes from Lawrence Berkley National Laboratory's Home Energy Saver calculator.[118] The model estimates that it is possible to achieve 19.5% energy savings and 56% natural gas savings in a building constructed in Hayward in 1960. For this calculation, it is assumed that these savings would not be achieved, but these savings were used for guidance in developing the program goals.

[118] http://hes3.lbl.gov/hes/ZipCarbon.taf?f=ZipCarbon&session_id=1252964

Program Goals

- **Phase 1** (2012 – 2017) – The goal of the first phase is to reduce electricity use by 1% and reduce natural gas use by 2.5% in participating multiple-unit homes. The goal is to get 12.5 % of residential units that were constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.
- **Phase 2** (2018 – 2030) – The goal of the second phase of this program is to reduce electricity use by 20% and reduce natural gas use by 20% in participating multiple-unit homes. The goal is to get 45 % of residential units that were constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.
- **Phase 3** (2031 – 2050) – The goal of the third phase of this program is to reduce electricity use by 100% and reduce natural gas use by 75% in participating multiple-unit homes. The goal is to get 100 % of residential units that were constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.

Program Impacts

- During Phase 1, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 17.27 MMBTU per unit. Projected electricity savings are 404 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 40.03 MMBTU per unit. Projected natural gas savings are 2,378 MMBTU. The estimated annual emissions savings is 149 metric tons of CO_2e by the end of the first phase.
- During Phase 2, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 13.95 MMBTU per unit. Projected electricity savings are 20,599 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 32.84 MMBTU per unit. Projected natural gas savings are 50,869 MMBTU. The annual emissions savings of 3,712 metric tons of CO_2e by the end of the second phase.
- During Phase 3, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 0.0 MMBTU per unit. Projected electricity savings are 213,917 MMBTU The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 10.26 MMBTU per unit. Projected natural gas savings are 428,542 MMBTU. The annual emissions savings is 32,474 metric tons of CO_2e by the end of the third phase.

Action 3.3 – Develop and implement commercial energy conservation ordinance

Action-specific Assumptions

This action only quantifies reductions for existing building stock since any new construction will be subject to the new green building ordinance. Only square footage data was available therefore calculation was made using total square footage. The total square footage of commercial space in Hayward in 2008 was 48,317,391 square feet. Emissions reductions are reported per square foot. Other applicable calculations and assumptions are the same as previous action.

Program Goals

- **Phase 1** (2012 – 2017) – The goal of the first phase of this program is to reduce electricity use by 1% and reduce natural gas use by 2% in participating commercial buildings. The goal is to get 12.5 % of commercial units that were constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.

- **Phase 2** (2018 – 2025) – The goal of the second phase of this program is to reduce electricity use by 20% and reduce natural gas use by 20% in participating commercial buildings. The goal is to get 45 % of commercial units that were constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.
- **Phase 3** (2026 – 2050) – The goal of the third phase of this program is to reduce electricity use by 100% and reduce natural gas use by 75% in participating commercial units. The goal is to get 100 % of commercial units that were constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.

Program Impacts

- During Phase 1, the projected electricity consumption without the program is 0.04796 MMBTU per square foot. With a program, the projected electricity consumption is 0.04748 MMBTU per square foot. Projected electricity savings are 2,897 MMBTU. The projected natural gas consumption without the program is 0.0334MMBTU per square foot. With a program, the projected natural gas consumption is 0.0328MMBTU per square foot. Projected natural gas savings are 4,040 MMBTU. The estimated annual emissions savings is 370 metric tons of CO_2e by the end of the first phase.
- During Phase 2, the projected electricity consumption without the program is 0.04796 MMBTU per square foot. With a program, the projected electricity consumption is 0.03837 MMBTU per square foot. Projected electricity savings are 150,629 MMBTU. The projected natural gas consumption without the program is 0.0334 MMBTU per square foot. With a program, the projected natural gas consumption is 0.0268 MMBTU per square foot. Projected natural gas savings are 109,084 MMBTU. The estimated annual emissions savings is 13,216 metric tons of CO_2e by the end of the second phase.
- During Phase 3, the projected electricity consumption without the program is 0.04796 MMBTU per square foot. With a program, the projected electricity consumption is 0.0 MMBTU per square foot. Projected electricity savings are 1,274,554 MMBTU. The projected natural gas consumption without the program is 0.0334MMBTU per square foot. With a program, the projected natural gas consumption is 0.0084MMBTU per square foot. Projected natural gas savings are 775,712 MMBTU. The estimated annual emissions savings is98,411metric tons of CO_2e by the end of the third phase.

Actions 3.4 – promote residents and businesses to voluntary commit to reducing energy consumption

GHG savings from these actions are not calculated or evaluated due to lack of sufficient data.

Action 3.5 – promote use of home energy monitors

GHG savings from these actions are not calculated or evaluated due to lack of sufficient data.

Action 3.6 – provide energy efficiency financing for single-family homes

Action-specific Assumptions

This program is vital to the success of the Residential Energy Conservation Ordinances, actions 3.1 and 3.2. Because the two programs will work in synergy, the emissions savings that are achieved because of the RECO should also be attributed to the financing program. To avoid double counting emissions reductions, the emissions reductions that can also be attributed to the RECO are not included in saving reported for this action.

Program Goals

- **Phase 1** (2011- 2015) – The goal of the first phase of this program is to reduce electricity use by 8% and reduce natural gas use by 8% in participating residential buildings (including single-unit, multiple-unit,

and mobile home units). The goal is to get 1.5 % of residential units that were constructed before the City's Green Building Ordinance took effect will participate in the program during this phase.

- **Phase 2** (2016- 2025) – The goal of the second phase of this program is to reduce electricity use by 20% and reduce natural gas use by 20% in participating residential buildings (including single-unit, multiple-unit, and mobile home units). The goal is to get 0.75 % of residential units that were constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.
- **Phase 3** (2026- 2050) – The goal of the third phase of this program is to reduce electricity use by 100% and reduce natural gas use by 75% in participating homes. The goal is to get 0.75 % of residential units that were constructed before the City's Green Building Ordinance took effect to participate in the program by the end of the phase.

Program Impacts

- During Phase 1, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 16.05 MMBTU per unit. Projected electricity savings are 614 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 37.77 MMBTU per unit. Projected natural gas savings are 1,445 MMBTU. The estimated annual emissions savings is 111 metric tons of CO_2e by the end of the first phase.
- During Phase 2, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 13.95 MMBTU per unit. Projected electricity savings are 1,442 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 32.84 MMBTU per unit. Projected natural gas savings are 3,395 MMBTU. The estimated annual emissions savings is 252 metric tons of CO_2e by the end of the second phase.
- During Phase 3, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 0.0 MMBTU per unit. Projected electricity savings are 5,631 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 10.26 MMBTU per unit. Projected natural gas savings are 12,252 MMBTU. The estimated annual emissions savings is 907 metric tons of CO_2e by the end of the third phase.

Action 3.7 - provide energy efficiency financing for multiple-family homes

Action-specific Assumptions

This program is vital to the success of the Residential Energy Conservation Ordinances, actions 3.1 and 3.2. Because the two programs will work in synergy, the emissions savings that are achieved because of the RECO should also be attributed to the financing program. To avoid double counting emissions reductions, the emissions reductions that can also be attributed to the RECO are not included in saving reported for this action.

Program Goals

- **Phase 1** (2011- 2015) – It is assumed that 1.5 % of residential units will participate in the program during this phase. The goal of the first phase of this program is to reduce electricity use by 8% and reduce natural gas use by 8% in participating homes.
- **Phase 2** (2016- 2025) – It is assumed that 0.75 % of residential units will participate in the program during this phase. The goal of the first phase of this program is to reduce electricity use by 20% and reduce natural gas use by 20% in participating homes.

- **Phase 3** (2026- 2050) – It is assumed that 0.75 % of residential units will participate in the program during this phase. The goal of the first phase of this program is to reduce electricity use by 100% and reduce natural gas use by 75% in participating homes.

Program Impacts

- During Phase 1, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 16.05 MMBTU per unit. Projected electricity savings are 394 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 37.77 MMBTU per unit. Projected natural gas savings are 927 MMBTU. The estimated annual emissions savings of 71 metric tons is CO_2e by the end of the first phase.
- During Phase 2, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 13.95 MMBTU per unit. Projected electricity savings are 1,040 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 32.84 MMBTU per unit. Projected natural gas savings are 2,448 MMBTU. The estimated annual emissions savings of 182 metric tons is CO_2e by the end of the second phase.
- During Phase 3, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 0.0 MMBTU per unit. Projected electricity savings are 3,318 MMBTU The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 10.26 MMBTU per unit. Projected natural gas savings are 7,610 MMBTU. The estimated annual emissions savings is 555 metric tons of CO_2e by the end of the third phase.

Action 3.8 - provide energy efficiency financing for commercial buildings

Action-specific Assumptions

This program is vital to the success of the Commercial Energy Conservation Ordinances, actions 3.3. Because the two programs will work in synergy, the emissions savings that are achieved because of the CECO should also be attributed to the financing program. To avoid double counting emissions reductions, the emissions reductions that can also be attributed to the CECO are not included in saving reported for this action.

Program Goals

- **Phase 1** (2010-2015) – It is assumed that 5 % of commercial units will participate in the program during this phase. The goal of the first phase of this program is to reduce electricity use by 8% and reduce natural gas use by 8% in participating commercial units.
- **Phase 2** (2016-2025) – It is assumed that 3% of commercial units will participate in the program during this phase. The goal of the first phase of this program is to reduce electricity use by 20% and reduce natural gas use by 20% in participating commercial units.
- **Phase 3** (2026- 2050) – It is assumed that 20 % of commercial units will participate in the program during this phase. The goal of the first phase of this program is to reduce electricity use by 20% and reduce natural gas use by 100% in participating commercial units.

Program Impacts

- During Phase 1, the projected electricity consumption without the program is .04796 MMBTU per square foot. With a program, the projected electricity consumption is .04412 MMBTU per square foot. Projected electricity savings are 10,112 MMBTU. The projected natural gas consumption without the program is 0.0334 MMBTU per square foot. With a program, the projected natural gas consumption is 0.0328 MMBTU per square foot. Projected natural gas savings are 7,052 MMBTU. The estimated annual emissions savings is 934 metric tons of CO_2e by the end of the first phase.

- During Phase 2, the projected electricity consumption without the program is .04796 MMBTU per square foot. With a program, the projected electricity consumption is 0.03837 MMBTU per square foot. Projected electricity savings are 27,285 MMBTU. The projected natural gas consumption without the program is 0.0334 MMBTU per square foot. With a program, the projected natural gas consumption is 0.0268 MMBTU per square foot. Projected natural gas savings are 19,028 MMBTU. The estimated annual emissions savings is 2,355 metric tons of CO_2e by the end of the second phase.
- During Phase 3, the projected electricity consumption without the program is .04796 MMBTU per square foot. With a program, the projected electricity consumption is 0.0 MMBTU per square foot. Projected electricity savings are 89,760 MMBTU. The projected natural gas consumption without the program is 0.0334MMBTU per square foot. With a program, the projected natural gas consumption is 0.0084 MMBTU per square foot. Projected natural gas savings are 427,481 MMBTU. The estimated annual emissions savings is 26,872 metric tons of CO_2e by the end of the third phase.

Strategy 4

Overall Strategy 4 Goal

1. Buildings constructed after 2030 will be carbon-neutral.

Strategy 4 Definitions

Renewable energy – energy derived from natural resources that are naturally replenished. Such resources include, sun, wind, tidal currents, and geothermal heat.

Assumptions Applicable to Every Action within Strategy 4

- For all actions within Strategy 4, the data source for electricity consumption is PG&E.
- Emissions factor of electricity supplied from the local utility changes over time because the sources of electricity generation change over time. It is assumed that in 25 percent of the electricity supplied from the local utility in 2020 will be generated using renewable sources, and that 35 percent of the electricity supplied from the local utility in 2050 will be generated using renewable source (see Section 2 of the CAP).
- It is assume that electricity generated from renewable sources does not emit any GHG emissions (emission factor = 0 tons CO_2e/MWh)
- This action only quantifies reductions from buildings that are constructed after 2008. Strategy 3 accounts for reductions from buildings constructed before the City's Green Building Ordinance took effect.

Action 4.1 – Continue to implement private development green building ordinance for residential buildings

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** (2009 – 2018) – The goal of the first phase of this program is to reduce electricity use by 2% and reduce natural gas use by 2% in participating homes. The goal is to get 100 % of newly constructed residential buildings to participate in the program.
- **Phase 2** (2019 – 2029) – The goal of the second phase of this program is to reduce electricity use by 75% and reduce natural gas use by 30% in participating homes. The goal is to get 100 % of newly constructed residential buildings to participate in the program.

- **Phase 3** (2030 – 2050) – The goal of the third phase of this program is to reduce electricity use by 100% and reduce natural gas use by 75% in participating homes. The goal is to get 100 % of newly constructed residential buildings to participate in the program.

Program Impacts

- During Phase 1, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 17.09 MMBTU per unit. Projected electricity savings are 1085 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 40.23 MMBTU per unit. Projected natural gas savings are 2,554 MMBTU. The estimated annual emissions savings is 193 metric tons of CO_2e by the end of the first phase.
- During Phase 2, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 13.08 MMBTU per unit. Projected electricity savings are 48,868 MMBTU. The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 28.75 MMBTU per unit. Projected natural gas savings are 47,546 MMBTU. The estimated annual emissions savings is 4,904 metric tons of CO_2e by the end of the second phase.
- During Phase 3, the projected per unit electricity consumption without the program is 17.44 MMBTU per unit. With a program, the projected per unit electricity consumption is 0.00 MMBTU per unit. Projected electricity savings are 183,370 MMBTU The projected per unit natural gas consumption without the program is 41.06 MMBTU per unit. With a program, the projected per unit natural gas consumption is 10.26 MMBTU per unit. Projected natural gas savings are 221,662 MMBTU. The estimated annual emissions savings is 23,433 metric tons of CO_2e by the end of the third phase.

Action 4.2 - Continue to implement private development green building ordinance for commercial buildings

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** – (2009 – 2018) The goal of the first phase of this program is to reduce electricity use by 3% and reduce natural gas use by 3% in participating commercial buildings. The goal is to get 100 % of newly constructed buildings to participate in the program.
- **Phase 2** – (2019 – 2028) The goal of the second phase of this program is to reduce electricity use by 75% and reduce natural gas use by 30% in participating commercial buildings. The goal is to get 100 % of newly constructed commercial buildings to participate in the program.
- **Phase 3** – (2029 – 2050) The goal of the third phase of this program is to reduce electricity use by 100% and reduce natural gas use by 75% in participating commercial buildings. The goal is to get 100 % of newly constructed commercial buildings to participate in the program.

Program Impacts

- During Phase 1, the projected electricity consumption without the program is 0.04796 MMBTU per square foot. With a program, the projected electricity consumption is 0.04317 MMBTU per square foot. Projected electricity savings are 30,652 MMBTU. The projected natural gas consumption without the program is 0.0334 MMBTU per square foot. With a program, the projected natural gas consumption is 0.0324 MMBTU per square foot. Projected natural gas savings are 6,413 MMBTU. The estimated annual emissions savings is 1,936 metric tons of CO_2e by the end of the first phase.

- During Phase 2, the projected electricity consumption without the program is 0.04796 MMBTU per square foot. With a program, the projected electricity consumption is 0.01199 MMBTU per square foot. Projected electricity savings are 318,803 MMBTU. The projected natural gas consumption without the program is 0.0334MMBTU per square foot. With a program, the projected natural gas consumption is 0.0234 MMBTU per square foot. Projected natural gas savings are 86,792 MMBTU. The estimated annual emissions savings is 20,043 metric tons of CO_2e by the end of the second phase.
- During Phase 3, the projected electricity consumption without the program is 0.04796 MMBTU per square foot. With a program, the projected electricity consumption is 0.0 MMBTU per square foot. Projected electricity savings are 1,215,403 MMBTU. The projected natural gas consumption without the program is 0.0334 MMBTU per square foot. With a program, the projected natural gas consumption is 0.0084 MMBTU per square foot. Projected natural gas savings are 555,739 MMBTU. The estimated annual emissions savings is 84,004 metric tons of CO_2e by the end of the third phase.

Strategy 5

Overall Strategy 5 Goal

1. 100 percent renewable electricity generation by 2050

Assumptions Applicable to Every Action within Strategy 5

- It is assumed that Hayward receives 2103.5 hours of full sun per year.[119]
- It is assumed that the solar de-rating factor is 33 percent.[120] The de-rating factor accounts for losses due to temperature, dirt and dust, wiring losses and mismatch, and DC to AC conversion.
- It is assumed that the size of the average photovoltaic system installed will gradually increase due to the future potential for consumers to sell electricity back into the grid.

Action 5.1 – Offer renewable energy financing program for residential buildings

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** (2010 – 2015) – The goal of the first phase of this program is to have an average capacity of 3 kW per system installed. The goal is to get 0.4 % of new residential units constructed during the phase to participate in the program.
- **Phase 2** (2016 – 2020) – The goal of the second phase of this program is to have an average capacity of 3.5 kW per system installed. The goal is to get 2 % of new residential units constructed during the phase to participate in the program.
- **Phase 3** (2021 – 2035) – The goal of the third phase of this program is to have an average capacity of 4 kW per system installed. The goal is to get 5 % of new residential units will participate in the program during this phase.

Program Impacts

- During Phase 1, the projected total capacity installed will be 605 kW and the percent of electricity demand offset by PV systems will be 0.1%. The estimated annual emissions savings is 160 metric tons of CO_2e by the end of the first phase.

[119] Source: National Renewable Energy Laboratory. Solar Radiation Data Manual for Flat Plate and Concentrating Collectors.
[120] California Energy Commission. Guide to Photovoltaic System Design and Installation. June 2001

- During Phase 2, the projected total capacity installed will be 2,936 kW and the percent of electricity demand offset by PV systems will be 0.5%. The estimated annual emissions savings is 850 metric tons of CO_2e by the end of the second phase.
- During Phase 3, the projected total capacity installed will be 6,458 kW and the percent of electricity demand offset by PV systems will be 1.1%. The estimated annual emissions savings is 2,274 metric tons of CO_2e by the end of the third phase.

Action 5.2 - Offer renewable energy financing program for commercial buildings

Action-specific Assumptions

Hayward data on commercial space was used in calculation. It includes floor space used for offices, warehouses, retail, research and development, and manufacturing. Assumption made that 10% of commercial space is appropriate for solar installation. One caveat is that the estimated roof space is a very rough approximation. It may be necessary to conduct a City-wide survey in order to obtain more accurate percentage of usable space. Potential emissions reductions are subject to change based on further analysis. Analyses assumes average system size will be 1 kW/100 square feet roof space for Phase 1 and Phase 2 and 1kW/80 square feet roof space for Phase 3. This assumes that system efficiency will improve over time.

Program Goals

- **Phase 1** (2010 – 2015) – 5 % percent of commercial square footage that has roof top available is participating in program during this phase.
- **Phase 2** (2016 – 2020) – 8 % percent of commercial square footage that has roof top available is participating in program during this phase.
- **Phase 3** (2021 – 2035) – 10 % percent of commercial square footage that has roof top available is participating in program during this phase.

Program Impacts

- During Phase 1, the projected total capacity installed will be 26,35 4kW and the percent of electricity demand offset by PV systems will be 3.6%. The estimated annual emissions savings is 6,985 metric tons of CO_2e by the end of the first phase.
- During Phase 2, the projected total capacity installed will be 18,514 kW and the percent of electricity demand offset by PV systems will be 5.8%. The estimated annual emissions savings is 10,768 metric tons of CO_2e by the end of the second phase.
- During Phase 3, the projected total capacity installed will be 61,323 kW and the percent of electricity demand offset by PV systems will be 11.7%. The estimated annual emissions savings is 24,153 metric tons of CO_2e by the end of the third phase.

Action 5.3 – Add renewable energy requirement into private development green building ordinance

Action-specific Assumptions

It is assumed that a higher percentage of energy will be provided from renewable sources which will lead to a lower electricity emission factor. It is also assumed that a mandatory program will not start until 2013 and only assumes 80% adoption rate due to the fact that not all buildings will be appropriate for solar, s.ome may fall under specified thresholds, etc.

Program Goals

- **Phase 1** (2013 – 2025) – 75 percent of newly constructed buildings will be constructed with PV. The average PV size is 3 kW for residential buildings and 1kW/100 square feet roof space for commercial buildings.
- **Phase 2** (2026 – 2050) – 75 percent of newly constructed buildings will be constructed with PV. The average PV size is 5 kW for residential buildings and 1kW/80 square feet roof space for commercial buildings.

Program Impacts

- By the end of Phase 1, the projected total capacity installed will be 68,229 kW. The estimated annual emissions savings is 15,877 metric tons of CO_2e by the end of the first phase. (This calculation is based on a start date of 2018. As directed by the Planning Commission and City Council, the City's goal will be to start this program in 2013, which will result in additional annual emissions savings in both Phases.)
- By the end of Phase 2, the projected total capacity installed will be 114,745 kW. The estimated annual emissions savings is 25,859 metric tons of CO_2e by the end of the first phase.

Action 5.4 – Increase portion of electricity provided by renewable energy

Program Goals

- **Phase 1** (2015 – 2020) – to have 33 percent of electricity supplied from renewable sources by the end of the phase.
- **Phase 2** (2021 – 2050) – to have 100 percent of electricity supplied from renewable sources by the end of the phase.

Program Impacts

- By the end of Phase 1, the projected total the estimated annual emissions savings is 32,026 metric tons of CO_2e.
- By the end of Phase 1, the projected total the estimated annual emissions savings is 77,414 metric tons of CO_2e.

Strategy 6

Overall Strategy 6 Goal

1. Eliminate emissions associated with methane emissions from solid-waste management by 2050.

It is assumed that the mix of recycled material is the same mix as that which was reported for 2007. Hayward's Baseline Greenhouse Gas Emissions Inventory only included organic waste material which would produce methane in a landfill.

Action 6.1 – Increase participation in recycling programs

Action-specific Assumptions

The business-as- usual case assumes that Hayward maintains the same level of recycling and organics collection as it achieved in 2005. This means that emissions savings reported in this action are from additional recycling that takes place above the 2005 recycling level.

Program Goals

- **Phase 1** (2009 – 2020) – by the end of the phase, divert 50% of mixed paper from the landfill.
- **Phase 2** (2021 – 2050) – by the end of the phase, Hayward recycles 100% of mixed paper from the landfill.

Program Impacts

- By the end of the first phase, the projected mass of paper diverted from the landfill annually because of program is projected to be 20,512 short tons which will result in an estimated annual emissions savings of 15,916 metric tons of CO_2e.
- By then end of Phase 2, the projected mass of paper diverted from the landfill annually because of program is projected to be 49,252 short tons which will result in an estimated annual emissions savings of 38,216 metric tons of CO_2e.

Action 6.2 – Increase participation in food-scraps collection programs

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** (2009 – 2020) – 15 % percent of food scraps diverted from landfill by end of phase.
- **Phase 2** (2021 – 2050) – 100 % percent of food scraps diverted from landfill by end of phase

Program Impacts

- By the end of the first phase, the projected mass of food scraps diverted from the landfill annually because of program is projected to be 3,403 short tons which will result in an estimated annual emissions savings of 3,403 metric tons of CO_2e.
- By then end of Phase 2, the projected mass of food scraps diverted from the landfill annually because of program is projected to be 11,963 short tons which will result in an estimated annual emissions savings of 27,236 metric tons of CO_2e.

Action 6.3 – Improve construction and demolition debris recycling program

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** (2010 – 2020) – 15 % percent of commercial and demolition (wood / textiles) waste that is diverted from the landfill.
- **Phase 2** (2021 – 2050) – 100 % percent of commercial and demolition (wood / textiles) waste that is diverted from the landfill.

Program Impacts

- During Phase 1, the projected mass of commercial and demolition waste diverted from the landfill annually because of program is projected to be 8,895 short tons. By then end of the first phase, the estimated annual emissions savings is 1.953 metric tons of CO_2e.
- During Phase 2, the projected mass of commercial and demolition waste diverted from the landfill annually because of program is projected to be 71,191 short tons. By then end of the second phase, the estimated annual emissions savings is 15,634 metric tons of CO_2e.

Action 6.4 – Ban certain materials from the landfill

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** (2009 – 2020) – divert 100 % of plant debris from the landfill by the end of the phase.

Program Impacts

- By then end of the phase, the projected mass of plant debris diverted from the landfill annually is projected to be 9,993 short tons which will result in an estimated annual emissions savings of 2,487 metric tons of CO_2e.

Action 6.5 – require residents and businesses to participate in recycling programs

This action will help the City meet the recycling goals In order to meet recycling goals as specified in Action 1. Emissions savings are accounted for in Action 1.

Action 6.6 – Encourage waste reduction

Action-specific Assumptions

- It is assumed that the mass of waste decreases over time. It is also assumed that emissions are directly proportional to mass (this means all types of materials are reduced in the same portions).

Program Goals

- **Phase 1** (2009-2050) – Divert 15 % percent of waste from landfill.

Program Impacts

- By then end of the Phase 1, the estimated annual emissions savings is 304 metric tons of CO_2e.

Action 6.7 – prefer waste management strategies that maximize the useful value of waste streams

Action-specific Assumptions

No action-specific assumptions

Program Goals

- **Phase 1** – (2009-2020) increase the landfill gas capture rate to 75% percent.

Program Impacts

- By then end of the Phase 1, the estimated annual emissions savings is 21,498 metric tons of CO_2e.

Strategy 7

Overall Strategy 7 Goal

1. Plant 10,500 trees by 2030

Action 7.1 – Increase participation in recycling programs

Action-specific Assumptions

Program Goals

- **Phase 1** – (2025-2030) plant 10,500 trees over five years

Program Impacts

- By then end of the Phase 1, the estimated annual emissions savings is 284 metric tons of CO_2e.

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Appendix D: Action Prioritization

One of the tools the City plans on using to determine the priority in which to implement actions is the prioritization score. Appendix D describes the scoring methodology then presents the results of the scoring process.

Scoring Methodology

Step 1:

The City established four evaluation criteria: (1) ease of implementation, (2) time to full implementation, (3) potential emissions reductions, and (4) cost. These criteria were based on evaluation criteria Sonoma County's used in its climate action plan. When considering the relative importance of the for criteria, the City determined that potential emissions reduction was the most important factor to consider, followed by cost, then ease of implementation, then time to full implementation. The four criteria were assigned a weighting factor to reflect the City's preference in the relative importance. The weighting factors are presented step 4.

Evaluation criteria are discussed in Section 6 of the CAP. Potential emissions reductions are also discussed in Appendix C.

Step 2:

The City wrote questions to guide its evaluation of proposed actions and their performance under each of the four main criteria. Answers were assigned a numerical value: higher scores translate to higher preference. The questions the City used to guide the evaluation process, and the numerical values assigned to the answers, are presented below:

Ease of Implementation

The City used the following questions to guide its evaluation of the how easy the proposed actions will be to implement.

1. What amount of human resources is required to develop and implement the program?
   (required resources are average or below average = 2, required resources are high = 1)

   –
   - Does Hayward have direct control over developing and implementing a program? Hayward does not have direct control over implementing the program if:
   - Hayward will have to collaborate with other local governments, state government, or federal government in order for the program to be implemented.
   - Existing state or federal policy or programs preempt local policy.
   - Local policy alone is enough to fully implement the action.
   - *(Hayward does have direct control = 2, Hayward does not have direct control = 1)*

   –
2. Does the program have stakeholder (political, resident, business) support or opposition
   (stakeholder support program or have a neutral stance= 2, stakeholders oppose program= 1)

3. How much voluntary community participation needed for program to successfully reduce emissions (note that actions that would call for mandatory participation would not require any voluntary participation)?
   (no or low level of voluntary participation required = 2, high level of voluntary participation required = 1)

4. Are there additional benefits (improved human health, reduced commute time, improved pedestrian safety, more affordable housing) that might help the program gain stakeholder support?
   (*yes = 2, no = 1)*

Time to Full Implementation

The City used the following questions to guide its evaluation of the time would take to implement the proposed actions.

1. Does the City expect that stakeholder opposition will delay the design and implementation of the program?
   (*yes = 1, no = 2)*

2. How long will it take reach maximum emissions savings?
   (five years or less= 3, five to ten years = 2, over ten years = 1)

3. Can the program be developed and approved within a year?
   (*yes = 2, no = 1)*

Potential Emissions Reductions

The City used the following questions to guide its evaluation of the potential emissions reductions from the proposed actions.

1. What are the estimated annual emissions savings (as compared to BAU projections) if the program is designed according to program goals identified in the CAP?
   (*over 5,000 metric tons CO_2e = 3, 1,000 – 5,000 metric tons CO_2e = 2, less than 1,000 metric tons CO_2e)*

Costs

The City used the following questions to guide its evaluation of the relative costs of the proposed actions.

1. Is there long-term funding in place to develop and implement the program?
   (*yes = 2, no = 1)*

2. Are there investment costs associated with the program such as construction costs (for bike lanes, safe pedestrian corridors, expanded rail services), or establishing seed funding (for loan programs)?
   (*no = 2, yes = 1)*

3. Are the administrative, or operation and maintenance, costs of the program expected to be exceedingly large as compared to other City programs?
   (*no = 2, yes = 1)*

4. Will the program result in cost savings to residents or businesses within a reasonable timeframe?
   (*yes = 2, no = 1)*

Step 3:

City evaluated each action by answering the questions presented in step 2. City recorded the numerical value that corresponded to the answer. Results are presented in the tables at the end of the appendix.

Step 4:

Scores were calculated to reflect the relative importance of each of the four criteria. This was achieved using the following calculation method:

1. The maximum possible score for each criteria was set to be 10 points, or levelized to 10 points. If the maximum score is not established then criteria with more questions would be unintentionally

weighted more heavily than criteria with fewer questions. The equation used to levelize the maximum score in each category follows:

Levelized score = (points received from answering questions in criteria) x (levelizing factor)

Where: levelizing factor = 10 ÷ maximum possible points from questions

The levelizing factor for each criteria are presented in the table below:

Criteria	Maximum Possible Points (from answering questions)	Levelizing Factor
Ease of implementation	**10**	**10/10 = 1.0**
Time to full implementation	**7**	**10/7 = 1.43**
Potential emissions reductions	**3**	**10/3 = 3.33**
Cost	**8**	**10/8 = 1.25**

2. The levelized scores from each criteria were then weighted based on the criteria's relative level importance, as assigned during Step 1. The weighting factors for each criteria are presented below:

Criteria	Weighting Factor
Ease of implementation	**2**
Time to full implementation	**1**
Potential emissions reductions	**4**
Cost	**3**

The equation for determining the levelized & weighed score is:

Levelized & weighed score = (levelized score) x (weighting factor)

3. Actions were prioritized based on the levelized and weighted score. The highest scoring actions were given highest priority. If two actions received the same score, the action with the highest potential annual emissions savings was given higher priority.

Scoring Results

Results from the scoring process are presented in the tables on the following pages.

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Community-wide Actions

Action Number	Short Description	ease of implementation (weighing factor = 2)								time to full implementation (weighing factor = 1)						potential emissions reductions (weighing factor = 4)				cost (weighing factor = 3)								Priority
		1. Human resources required to develop and implement program	2. Does Hayward have direct control over program?	3. Does the program have stakeholder support or opposition	4. How much voluntary community participation is needed?	5. Are there additional benefits that might help the program gain stakeholder support?	**unweighted & unlevelized score** *(maximum score = 10)*	**unweighted levelized score** *(levelizing factor = 1.0) (maximum score = 10)*	**weighted score** *(weighting factor = 2) (maximum score = 20)*	1. Does the city expect that stakeholder opposition will delay the design and implementation of the program?	2. How long will it take reach maximum annual emissions savings?	3. Can the program be developed and initiated within a year?	**unweighted & unlevelized score** *(maximum score = 7)*	**unweighted levelized score** *(levelizing factor = 1.43) (maximum score = 10)*	**weighted score** *(weighting factor = 2) (maximum score = 10)*	**Community-wide Actions** What are the estimated emissions reductions in 2050?	**unweighted & unlevelized score** *(maximum score = 3)*	**unweighted levelized score** *(levelizing factor = 3.33) (maximum score = 10)*	**weighted score** *(weighting factor = 4) (maximum score = 40)*	1. Is long-term funding in place ?	2. Are there additional investment costs?	3. Are administrative costs expected to be relatively large in relation to other actions?	4. Will the program result in cost savings to residents, businesses, or the City?	**unweighted & unlevelized score** *(maximum score = 8)*	**unweighted levelized score** *(levelizing factor = 1.25) (maximum score = 10)*	**weighted score** *(weighting factor = 3) (maximum score = 30)*	**weighted score Community-wide Actions**	
		1= more than average 2 = average or less than average	*1= doesn't have direct control 2 = has direct control*	*1 = stakeholder opposition 2 = stakeholder support or neutrality*	*1 = high level 2 = no or low level*	*1 = no 2 = yes*				*1 = yes 2 = no*	*1 = over ten years 2 = five to ten years 3 = five years or less*	*1 = no 2 = yes*				*1 = less than 1,000 MTCO2e 2 = 10,000 – 100,000 MTCO2e 3 = over 100,000 MTCO2e*				*1 = no 2 = yes*	*1 = yes 2 = no*	*1= yes 2 = no*	*1 = no 2 = yes*					
Action 1.1	assist businesses in providing commuter benefits programs	2	2	2	1	2	9	9	**18**	2	1	2	5	7.1	**7.1**	1	1	3.3	**13.3**	1	1	1	2	5	6.3	**18.8**	57.2	**36**
Action 1.2	assist businesses in establishing car share / bike-share programs	2	1	1	1	2	7	7	**14**	1	1	2	4	5.7	**5.7**	1	1	3.3	**13.3**	1	2	2	2	7	8.8	**26.3**	59.3	**33**
Action 1.3	update parking policies to encourage reduction in vehicle travel	1	2	1	2	1	7	7	**14**	1	1	2	4	5.7	**5.7**	1	1	3.3	**13.3**	1	2	2	1	6	7.5	**22.5**	55.5	**38**
Action 1.4	expand transit services to encourage reductions in vehicle travel	1	1	2	2	2	8	8	**16**	2	1	1	4	5.7	**5.7**	2	1	6.7	**26.7**	1	1	1	1	4	5.0	**15.0**	63.4	**30**
Action 1.5	continue to implement bike master-plan	2	2	2	1	2	9	9	**18**	2	1	2	5	7.1	**7.1**	1	1	3.3	**13.3**	1	1	2	1	5	6.3	**18.8**	57.2	**37**
Action 1.6	develop and implement pedestrian master-plan	1	2	2	1	2	8	8	**16**	2	1	2	5	7.1	**7.1**	1	1	3.3	**13.3**	1	1	2	1	5	6.3	**18.8**	55.2	**39**
Action 1.7	update the Circulation Element of the General Plan to evaluate expansions of appropriate modes of transit	2	2	2	1	2	9	9	**18**	2	1	2	5	7.1	**7.1**	2	2	6.7	**26.7**	1	1	2	1	5	6.3	**18.8**	70.6	**25**
Action 1.8	prioritize traffic-flow management practices to reduce idling time	1	1	2	2	2	8	8	**16**	2	3	2	7	10.0	**10.0**	2	1	6.7	**26.7**	1	1	2	1	5	6.3	**18.8**	71.4	**22**
Action 1.9	encourage high density, mixed-use, smart-growth development in areas near public transit stations	2	1	2	1	2	8	8	**16**	2	1	2	5	7.1	**7.1**	2	2	6.7	**26.7**	1	1	2	1	5	6.3	**18.8**	68.6	**27**
Action 1.10	align zoning policies to minimize vehicle travel	2	2	2	2	2	10	10	**20**	2	1	2	5	7.1	**7.1**	2	2	6.7	**26.7**	1	2	2	1	6	7.5	**22.5**	76.3	**9**
Action 1.11	increase availability of affordable housing for people employed in Hayward	2	2	2	2	2	10	10	**20**	2	3	1	6	8.6	**8.6**	2	2	6.7	**26.7**	1	1	2	1	5	6.3	**18.8**	74.0	**13**
Action 1.12	incentivize filling local jobs with local residents	1	1	2	2	2	8	8	**16**	2	1	1	4	5.7	**5.7**	2	2	6.7	**26.7**	1	1	1	1	4	5.0	**15.0**	63.4	**31**
Action 2.1	provide incentives for low-carbon vehicles and low-carbon fuels	2	2	1	2	2	9	9	**18**	1	1	2	4	5.7	**5.7**	3	1	10.0	**40.0**	1	1	1	2	5	6.3	**18.8**	82.5	**5**
Action 2.2	collaborate the state and federal government on policies that promote low-carbon vehicles and low-carbon fuels	2	1	2	2	2	9	9	**18**	2	2	1	5	7.1	**7.1**	3	1	10.0	**40.0**	1	2	1	1	5	6.3	**18.8**	83.9	**4**
Action 3.1	develop and implement Residential Energy Conservation Ordinance for single-family homes	1	2	1	2	2	8	8	**16**	1	1	2	4	5.7	**5.7**	2	2	6.7	**26.7**	1	2	1	2	6	7.5	**22.5**	70.9	**23**
Action 3.2	develop and implement Residential Energy Conservation Ordinance for multiple-family homes	1	2	1	2	2	8	8	**16**	1	1	2	4	5.7	**5.7**	2	2	6.7	**26.7**	1	2	1	2	6	7.5	**22.5**	70.9	**24**
Action 3.3	develop and implement Commercial Energy Conservation Ordinance	1	2	1	2	2	8	8	**16**	1	1	2	4	5.7	**5.7**	3	3	10.0	**40.0**	1	2	1	2	6	7.5	**22.5**	84.2	**3**
Action 3.4	actively participate in low-income weatherization programs	3	1	2	2	2	10	10	**20**	2	2	2	6	8.6	**8.6**	2	2	6.7	**26.7**	2	2	2	2	8	10.0	**30.0**	85.2	**2**
Action 3.5	promote a voluntary commitment for businesses and residents to reduce energy consumption	2	2	2	1	1	8	8	**16**	2	1	2	5	7.1	**7.1**	2	2	6.7	**26.7**	1	2	2	2	7	8.8	**26.3**	76.1	**10**
Action 3.6	promote use of home energy monitors	1	2	2	1	1	7	7	**14**	2	2	2	6	8.6	**8.6**	2	2	6.7	**26.7**	1	1	2	2	6	7.5	**22.5**	71.7	**21**
Action 3.7	energy efficiency financing program for single-family homes	2	2	2	1	2	9	9	**18**	2	1	2	5	7.1	**7.1**	2	2	6.7	**26.7**	2	1	2	2	7	8.8	**26.3**	78.1	**6**
Action 3.8	offer energy efficiency financing program for	2	2	2	1	2	9	9	**18**	2	1	2	5	7.1	**7.1**	2	2	6.7	**26.7**	2	1	2	2	7	8.8	**26.3**	78.1	**7**

Action Number	Short Description	ease of implementation (weighing factor = 2)								time to full implementation (weighing factor = 1)						potential emissions reductions (weighing factor = 4)				cost (weighing factor = 3)								Priority
		1. Human resources required to develop and implement program	2. Does Hayward have direct control over program?	3. Does the program have stakeholder support or opposition	4. How much voluntary community participation is needed?	5. Are there additional benefits that might help the program gain stakeholder support?	**unweighted & unlevelized score** *(maximum score = 10)*	**unweighted levelized score** *(levelizing factor = 1.0)* *(maximum score = 10)*	**weighted score** *(weighting factor = 2)* *(maximum score = 20)*	1. Does the city expect that stakeholder opposition will delay the design and implementation of the program?	2. How long will it take reach maximum annual emissions savings?	3. Can the program be developed and initiated within a year?	**unweighted & unlevelized score** *(maximum score = 7)*	**unweighted levelized score** *(levelizing factor = 1.43)* *(maximum score = 10)*	**weighted score** *(weighting factor = 2)* *(maximum score = 10)*	**Community-wide Actions** What are the estimated emissions reductions in 2050?	**unweighted & unlevelized score** *(maximum score = 3)*	**unweighted levelized score** *(levelizing factor = 3.33)* *(maximum score = 10)*	**weighted score** *(weighting factor = 4)* *(maximum score = 40)*	1. Is long-term funding in place ?	2. Are there additional investment costs?	3. Are administrative costs expected to be relatively large in relation to other actions?	4. Will the program result in cost savings to residents, businesses, or the City?	**unweighted & unlevelized score** *(maximum score = 8)*	**unweighted levelized score** *(levelizing factor = 1.25)* *(maximum score = 10)*	**weighted score** *(weighting factor = 3)* *(maximum score = 30)*	**weighted score Community-wide Actions**	
		1= more than average 2 = average or less than average	*1= doesn't have direct control 2 = has direct control*	*1 = stakeholder opposition 2 = stakeholder support or neutrality*	*1 = high level 2 = no or low level*	*1 = no 2 = yes*				*1 = yes 2 = no*	*1 = over ten years 2 = five to ten years 3 = five years or less*	*1 = no 2 = yes*				*1 = less than 1,000 MTCO2e 2 = 10,000 – 100,000 MTCO2e 3 = over 100,000 MTCO2e*				*1 = no 2 = yes*	*1 = yes 2 = no*	*1= yes 2 = no*	*1 = no 2 = yes*					
	multiple-family homes																											
Action 3.9	offer energy efficiency financing program for commercial buildings	2	2	**18**	2	2	9	9			1	2	5	7.1	**7.1**	3	3	10.0	**40.0**	2	1	2	2	7	8.8	**26.3**	91.4	**1**
Action 4.1	continue to implement private development green building ordinance for residential buildings	2	2	1	2	2	9	9	**18**	1	1	2	4	5.7	**5.7**	2	2	6.7	**26.7**	1	1	2	2	6	7.5	**22.5**	72.9	**20**
Action 4.2	continue to implement private development green building ordinance for commercial buildings	2	2	1	2	2	9	9	**18**	1	1	2	4	5.7	**5.7**	2	2	6.7	**26.7**	1	1	2	2	6	7.5	**22.5**	72.9	**18**
Action 5.1	offer renewable energy financing program for residential buildings	2	2	2	1	2	9	9	**18**	2	1	2	5	7.1	**7.1**	1	1	3.3	**13.3**	1	2	2	2	7	8.8	**26.3**	64.7	**29**
Action 5.2	offer renewable energy financing program for commercial buildings	2	2	2	1	2	9	9	**18**	2	1	2	5	7.1	**7.1**	2	2	6.7	**26.7**	1	2	2	2	7	8.8	**26.3**	78.1	**8**
Action 5.3	add renewable energy requirement into private development green building ordinance, RECO, and CECO	2	2	1	2	2	9	9	**18**	1	1	2	4	5.7	**5.7**	2	2	6.7	**26.7**	1	1	2	2	6	7.5	**22.5**	72.9	**19**
Action 5.4	increase portion of electricity provided by renewable energy	1	1	1	1	2	6	6	**12**	1	2	1	4	5.7	**5.7**	2	2	6.7	**26.7**	1	1	1	1	4	5.0	**15.0**	59.4	**32**
Action 6.1	increase participation in recycling programs	2	1	2	1	1	7	7	**14**	2	2	2	6	8.6	**8.6**	2	2	6.7	**26.7**	2	1	1	1	5	6.3	**18.8**	68.0	**28**
Action 6.2	increase participation in food-scraps collection programs	1	1	2	1	1	6	6	**12**	2	2	2	6	8.6	**8.6**	2	2	6.7	**26.7**	2	2	1	1	6	7.5	**22.5**	69.7	**26**
Action 6.3	improve construction and demolition debris program	2	2	2	1	1	8	8	**16**	2	2	2	6	8.6	**8.6**	2	2	6.7	**26.7**	2	2	1	1	6	7.5	**22.5**	73.7	**14**
Action 6.4	ban certain materials from landfills	1	2	1	1	1	6	6	**12**	1	2	2	5	7.1	**7.1**	1	1	3.3	**13.3**	2	2	1	1	6	7.5	**22.5**	55.0	**40**
Action 6.5	require residents / businesses to participate in recycling programs	2	2	2	1	1	8	8	**16**	2	3	2	7	10.0	**10.0**	2	2	6.7	**26.7**	2	2	1	1	6	7.5	**22.5**	75.2	**12**
Action 6.6	encourage waste reduction and promote recycling participation at multi-family properties	1	2	2	1	1	7	7	**14**	2	2	2	6	8.6	**8.6**	1	1	3.3	**13.3**	2	2	1	1	6	7.5	**22.5**	58.4	**34**
Action 6.7	prefer waste management strategies that maximize the useful value of waste streams	2	2	2	1	1	8	8	**16**	2	3	2	7	10.0	**10.0**	2	2	6.7	**26.7**	2	2	1	1	6	7.5	**22.5**	75.2	**11**
Action 7.1	maximize carbon sequestration within City	2	2	2	2	2	10	10	**20**	2	3	2	7	10.0	**10.0**	1	1	3.3	**13.3**	1	1	1	1	4	5.0	**15.0**	58.3	**35**
Action 8.1	PLACE HOLDER - ACTIONS NOT DEFINED	---	---	---	---	---	---	---	**---**	---	---	---	---	---	**---**	---	---	---	**---**	---	---	---	---	---	---	**---**	---	**---**
Action 9.1	create green-portal website	2	2	2	1	2	9	9.0	**18.0**	2	3	2	7	10.0	**10.0**	2	2	6.7	**26.7**	1	1	1	2	5	6.3	**18.8**	73.4	**15**
Action 9.2	develop and implement plan to engage residents in emissions reductions activities	2	2	2	1	2	9	9.0	**18.0**	2	3	2	7	10.0	**10.0**	2	2	6.7	**26.7**	1	1	1	2	5	6.3	**18.8**	73.4	**16**
Action 9.3	develop and implement plan to engage businesses in emissions reductions activities	2	2	2	1	2	9	9.0	**18.0**	2	3	2	7	10.0	**10.0**	2	2	6.7	**26.7**	1	1	1	2	5	6.3	**18.8**	73.4	**17**

Municipal Operations Actions

Action Number	Short Description	ease of implementation (weighing factor = 2)								time to full implementation (weighing factor = 1)						potential emissions reductions (weighing factor = 4)				cost (weighing factor = 3)								Priority
		1. Human resources required to develop and implement program	2. Does Hayward have direct control over program?	3. Does the program have stakeholder support or opposition	4. How much voluntary community participation is needed?	5. Are there additional benefits that might help the program gain stakeholder support?	**unweighted & unlevelized score** *(maximum score = 10)*	**unweighted levelized score** *(levelizing factor = 1.0)* *(maximum score = 10)*	**weighted score** *(weighting factor = 2)* *(maximum score = 20)*	1. Does the city expect that stakeholder opposition will delay the design and implementation of the program?	2. How long will it take reach maximum annual emissions savings?	3. Can the program be developed and initiated within a year?	**unweighted & unlevelized score** *(maximum score = 7)*	**unweighted levelized score** *(levelizing factor = 1.43)* *(maximum score = 10)*	**weighted score** *(weighting factor = 2)* *(maximum score = 10)*	**Municipal Actions** What are the estimated emissions reductions when fully implemented ?	**unweighted & unlevelized score** *(maximum score = 3)*	**unweighted levelized score** *(levelizing factor = 3.33)* *(maximum score = 10)*	**weighted score** *(weighting factor = 4)* *(maximum score = 40)*	1. Is long-term funding in place ?	2. Are there additional investment costs?	3. Are administrative costs expected to be relatively large in relation to other actions?	4. Will the program result in cost savings to residents, businesses, or the City?	**unweighted & unlevelized score** *(maximum score = 8)*	**unweighted levelized score** *(levelizing factor = 1.25)* *(maximum score = 10)*	**weighted score** *(weighting factor = 3)* *(maximum score = 30)*	**weighted score Municipal Actions**	
		1= more than average 2 = average or less than average	*1= doesn't have direct control 2 = has direct control*	*1 = stakeholder opposition 2 = stakeholder support or neutrality*	*1 = high level 2 = no or low level*	*1 = no 2 = yes*				*1 = yes 2 = no*	*1 = over ten years 2 = five to ten years 3 = five years or less*	*1 = no 2 = yes*				*1= less than 100 MTCO2e 2 = 100 - 1000 MTCO2e 3 = over 1000 MTCO2e*				*1 = no 2 = yes*	*1 = yes 2 = no*	*1= yes 2 = no*	*1 = no 2 = yes*					
Action 1.13	provide commuter benefits to government employees	2	2	2	1	2	9	9.0	**18.0**	2	2	2	6	8.6	**8.6**	2	2	6.7	**26.7**	1	1	1	2	5	2.5	**7.5**	60.7	**7**
Action 1.14	develop car-share and/or bike-share program for city employees	2	1	1	1	2	7	7.0	**14.0**	1	2	1	4	5.7	**5.7**	2	2	6.7	**26.7**	1	2	2	2	7	2.5	**7.5**	53.9	**15**
Action 1.15	prefer facilities with convenient access to public transit	2	2	2	2	2	10	10.0	**20.0**	2	3	2	7	10.0	**10.0**	2	2	6.7	**26.7**	2	2	2	1	7	1.3	**3.8**	60.4	**8**
Action 2.3	procure fuel-efficient and low-carbon fuel vehicles for municipal fleet	2	2	2	2	2	10	10.0	**20.0**	2	1	2	5	7.1	**7.1**	2	2	6.7	**26.7**	2	2	2	2	8	2.5	7.5	61.3	**6**
Action 2.4	negotiate alternative-fuel and fuel economy requirements into new contracts and franchise agreements	2	1	2	1	1	7	7.0	**14.0**	2	1	2	5	7.1	**7.1**	2	2	6.7	**26.7**	1	2	2	2	7	2.5	**7.5**	55.3	**12**
Action 3.10	upgrade streetlights to LEDs	2	2	2	1	1	8	8.0	**16.0**	2	3	2	7	10.0	**10.0**	3	3	10.0	**40.0**	1	2	2	2	7	2.5	**7.5**	73.5	**1**
Action 3.11	prepare and implement energy conservation plan for municipal buildings	1	2	2	1	1	7	7.0	**14.0**	2	1	2	5	7.1	**7.1**	3	3	10.0	**40.0**	1	1	1	2	5	2.5	**7.5**	68.6	**3**
Action 3.12	audit city buildings and identify energy savings opportunities	2	2	2	2	1	9	9.0	**18.0**	2	1	2	5	7.1	**7.1**	3	3	10.0	**40.0**	1	2	2	2	7	2.5	**7.5**	72.6	**2**
Action 4.3	continue to implement municipal green building ordinance	2	2	2	2	2	10	10.0	**20.0**	1	1	2	4	5.7	**5.7**	1	1	3.3	**13.3**	1	1	2	2	6	2.5	**7.5**	46.5	**9**
Action 5.5	assess city buildings and identify buildings best-suited for renewable energy	2	2	2	2	1	9	9.0	**18.0**	1	1	2	4	5.7	**5.7**	3	3	10.0	**40.0**	1	1	2	1	5	1.3	**3.8**	67.5	**4**
Action 5.6	maximize renewable generation on municipal property	2	2	2	2	1	9	9.0	**18.0**	1	1	2	4	5.7	**5.7**	3	3	10.0	**40.0**	1	1	2	1	5	1.3	**3.8**	67.5	**5**
Action 6.8	implement recycling programs in city buildings	2	2	2	1	1	8	8.0	**16.0**	2	2	2	6	8.6	**8.6**	1	1	3.3	**13.3**	2	2	2	1	7	1.3	**3.8**	41.7	**16**
Action 6.9	implement food scraps collection programs in city buildings	2	2	2	1	1	8	8.0	**16.0**	2	2	2	6	8.6	**8.6**	2	2	6.7	**26.7**	2	2	2	1	7	1.3	**3.8**	55.0	**13**
Action 6.10	develop environmentally friendly purchasing program	1	2	2	2	1	8	8.0	**16.0**	1	3	2	6	8.6	**8.6**	2	2	6.7	**26.7**	1	2	2	1	6	1.3	**3.8**	55.0	**14**
Action 7.2	maximize carbon sequestration on municipal property	2	2	2	2	2	10	10.0	**20.0**	2	2	2	6	8.6	**8.6**	1	1	3.3	**13.3**	1	1	1	1	4	1.3	**3.8**	45.7	**17**
Action 8.2	PLACE HOLDER - ACTIONS NOT DEFINED	---	---	---	---	---	---	---	**---**	---	---	---	---	---	**---**	---	---	---	**---**	---	---	---	---	---	---	**---**	---	**---**
Action 9.4	offer climate education programs to City employees	2	2	2	1	1	8	8.0	**16.0**	2	3	2	7	10.0	**10.0**	2	2	6.67	**26.67**	1	2	1	2	6	2.5	**7.5**	60.2	**9**
Action 9.5	demonstrate leadership by setting municipal reduction targets. Work to achieve these targets	1	2	2	2	2	9	9.0	**18.0**	1	1	2	4	5.7	**5.7**	2	2	6.67	**26.67**	1	1	1	2	5	2.5	**7.5**	57.9	**11**
Action 9.6	when awarding contracts, request applicants provide information about sustainability practices	2	2	2	2	1	9	9.0	**18.0**	2	1	2	5	7.1	**7.1**	2	2	6.67	**26.67**	1	2	2	2	7	2.5	**7.5**	59.3	**10**

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Appendix E: Recommended Implementation Timing

Strategy and Action		Proposed Timeline
		2009 2010 2011 2012 2013 2014 2015 2016 2017 2018 2019 2020 2021 2022 2023 2024 2025 2026 2027 2028 2029 2030 2031 2032 2033 2034 2035 2036 2037 2038 2039 2040 2041 2042 2043 2044 2045 2046 2047 2048 2049 2050
Strategy 1 – Transportation and Land Use: Reduce Vehicle Miles Traveled		
Action 1.1	assist businesses in providing commuter benefits programs	development; Phase 1; Phase 2
Action 1.2	assist businesses in establishing car share / bike-share programs	development; Phase 1; Phase 2
Action 1.3	update parking policies to encourage reduction in vehicle travel	development; Phase 1; Phase 2
Action 1.4	expand public transit services to encourage reductions in vehicle travel	development; Phase 1; Phase 2
Action 1.5	continue to implement bike master-plan	Phase 1; Phase 2
Action 1.6	develop and implement pedestrian master-plan	development; Phase 1; Phase 2
Action 1.7	update the Circulation Element of the General Plan to evaluate expansions of appropriate modes of transit	development
Action 1.8	prioritize traffic-flow management practices to reduce idling time	development; Phase 1
Action 1.9	encourage high density, mixed-use, smart-growth development in areas near public transit stations	Continuous effort, already under way
Action 1.10	align zoning policies to minimize vehicle travel	Continuous effort, already under way
Action 1.11	increase availability of affordable housing for people employed in Hayward	*timing not yet determined*
Action 1.12	incentivize filling local jobs with local residents	*timing not yet determined*
Strategy 2 – Transportation: Decrease Carbon-intensity of Vehicles		
Action 2.1	provide incentives for low-carbon vehicles and low-carbon fuels	development; Continuous effort with lead-in time to examine ways to advocate and participate in regional, state, and federal programs
Action 2.2	collaborate the state and federal government on policies that promote low-carbon vehicles and low-carbon fuels	development; Continuous effort with lead-in time to examine ways to advocate and participate in regional, state, and federal programs
Strategy 3 – Energy: Improve Energy Performance of Existing Buildings		
Action 3.1	develop and implement Residential Energy Conservation Ordinance for single-family homes	development; Phase 1; Phase 2; Phase 3
Action 3.2	develop and implement Residential Energy Conservation Ordinance for multiple-family homes	development; Phase 1; Phase 2; Phase 3
Action 3.3	develop and implement Commercial Energy Conservation Ordinance	development; Phase 1; Phase 2; Phase 3
Action 3.4	actively participate in low-income weatherization programs	development; Continuous with lead-in time for initial outreach
Action 3.5	promote a voluntary commitment for businesses and residents to reduce energy consumption	development; Continuous with lead-in time for initial outreach
Action 3.6	promote use of home energy monitors	development; Continuous with lead-in time for initial outreach
Action 3.7	offer energy efficiency financing program for single-family homes	development; Phase 1; Phase 2; Phase 3
Action 3.8	offer energy efficiency financing program for multiple-family homes	development; Phase 1; Phase 2; Phase 3
Action 3.9	offer energy efficiency financing program for commercial buildings	development; Phase 1; Phase 2; Phase 3
Strategy 4 – Energy: Improve Energy Performance of New Buildings		
Action 4.1	continue to implement private development green building ordinance for residential buildings	Phase 1; Phase 2; Phase 3
Action 4.2	continue to implement private development green building ordinance for commercial buildings	Phase 1; Phase 2; Phase 3
Strategy 5 – Energy: Use Renewable Energy		
Action 5.1	offer renewable energy financing program for residential buildings	development; Phase 1; Phase 2; Phase 3
Action 5.2	offer renewable energy financing program for commercial buildings	development; Phase 1; Phase 2; Phase 3
Action 5.3	add renewable energy requirement into private development green building ordinance, RECO, and CECO	development; Phase 1; Phase 2
Action 5.4	increase portion of electricity provided by renewable energy	Continuous effort
Strategy 6 – Solid Waste: Increase Waste Reduction and Recycling		
Action 6.1	increase participation in recycling programs	development; Phase 1; Phase 2
Action 6.2	increase participation in food-scraps collection programs	development; Phase 1; Phase 2
Action 6.3	improve construction and demolition debris program	development; Phase 1; Phase 2
Action 6.4	ban certain materials from landfill	development; Phase 1
Action 6.5	require residents / businesses to participate in recycling programs	development; Phase 1
Action 6.6	encourage waste reduction and promote recycling participation at multi-family properties	Continuous
Action 6.7	prefer waste management strategies that maximize the useful value of waste streams	development; Phase 1
Strategy 7 – Sequester Carbon		
Action 7.1	maximize carbon sequestration within City	timing not yet determined
Strategy 8 – Climate Change Adaptation		
Action 8.1	*no actions defined*	timing not yet determined
Strategy 9 – Engage and Educate Community		
Action 9.1	create green-portal website	development; Phase 1
Action 9.2	develop and implement plan to engage residents in emissions reductions activities	development; Phase 1
Action 9.3	develop and implement plan to engage businesses in emissions reductions activities	development; Phase 1

Key
- development
- continuous
- phase 1
- phase 2
- phase 3

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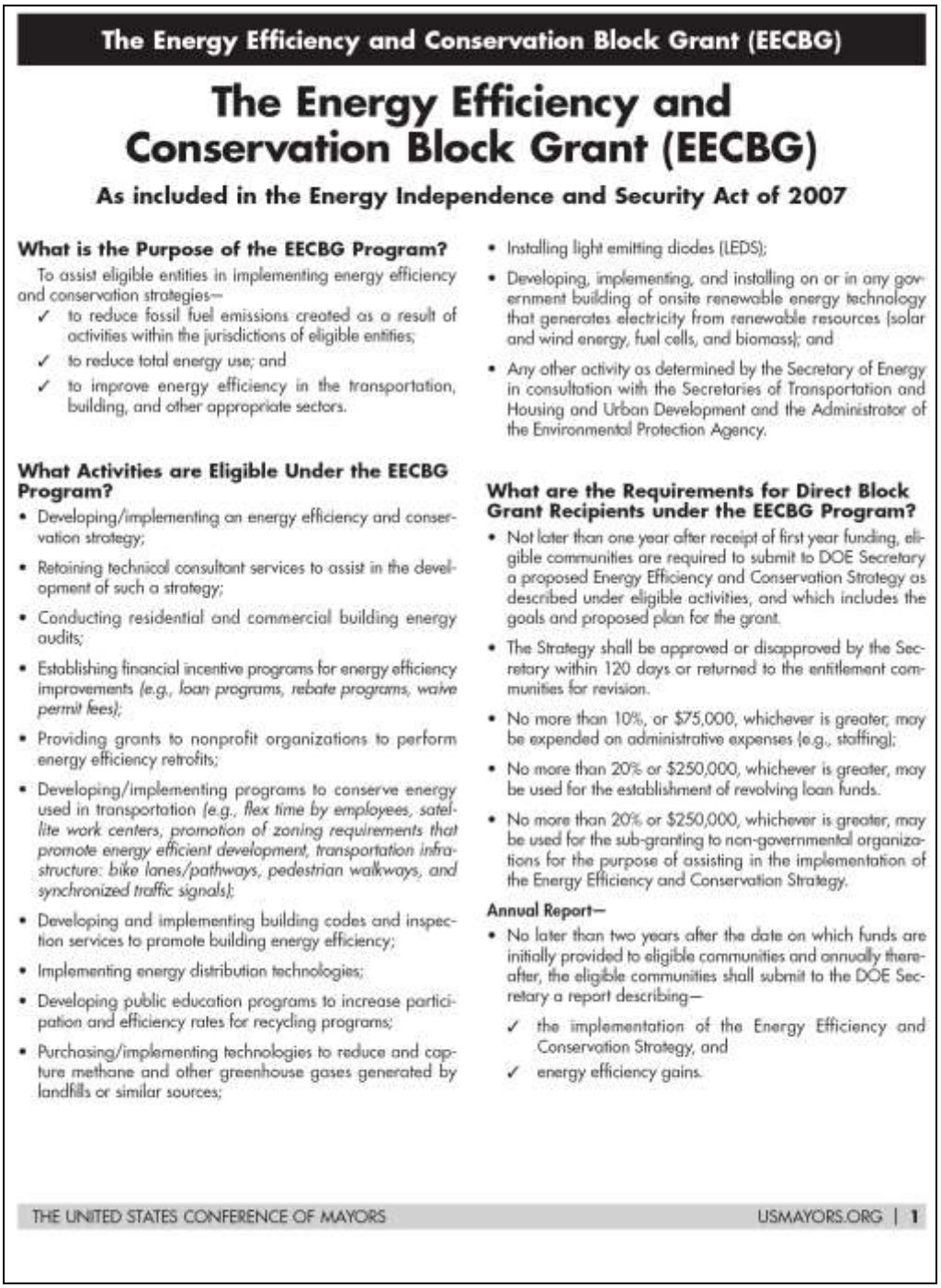
Appendix F: Energy Efficiency and Conservation Block Grant Information



The Energy Efficiency and Conservation Block Grant (EECBG)

The Energy Efficiency and Conservation Block Grant (EECBG)

As included in the Energy Independence and Security Act of 2007

What is the Purpose of the EECBG Program?

To assist eligible entities in implementing energy efficiency and conservation strategies—

- ✓ to reduce fossil fuel emissions created as a result of activities within the jurisdictions of eligible entities;
- ✓ to reduce total energy use; and
- ✓ to improve energy efficiency in the transportation, building, and other appropriate sectors.

What Activities are Eligible Under the EECBG Program?

- Developing/implementing an energy efficiency and conservation strategy;
- Retaining technical consultant services to assist in the development of such a strategy;
- Conducting residential and commercial building energy audits;
- Establishing financial incentive programs for energy efficiency improvements *(e.g., loan programs, rebate programs, waive permit fees)*;
- Providing grants to nonprofit organizations to perform energy efficiency retrofits;
- Developing/implementing programs to conserve energy used in transportation *(e.g., flex time by employees, satellite work centers, promotion of zoning requirements that promote energy efficient development, transportation infrastructure: bike lanes/pathways, pedestrian walkways, and synchronized traffic signals)*;
- Developing and implementing building codes and inspection services to promote building energy efficiency;
- Implementing energy distribution technologies;
- Developing public education programs to increase participation and efficiency rates for recycling programs;
- Purchasing/implementing technologies to reduce and capture methane and other greenhouse gases generated by landfills or similar sources;
- Installing light emitting diodes (LEDS);
- Developing, implementing, and installing on or in any government building of onsite renewable energy technology that generates electricity from renewable resources (solar and wind energy, fuel cells, and biomass); and
- Any other activity as determined by the Secretary of Energy in consultation with the Secretaries of Transportation and Housing and Urban Development and the Administrator of the Environmental Protection Agency.

What are the Requirements for Direct Block Grant Recipients under the EECBG Program?

- Not later than one year after receipt of first year funding, eligible communities are required to submit to DOE Secretary a proposed Energy Efficiency and Conservation Strategy as described under eligible activities, and which includes the goals and proposed plan for the grant.
- The Strategy shall be approved or disapproved by the Secretary within 120 days or returned to the entitlement communities for revision.
- No more than 10%, or $75,000, whichever is greater, may be expended on administrative expenses (e.g., staffing);
- No more than 20% or $250,000, whichever is greater, may be used for the establishment of revolving loan funds.
- No more than 20% or $250,000, whichever is greater, may be used for the sub-granting to non-governmental organizations for the purpose of assisting in the implementation of the Energy Efficiency and Conservation Strategy.

Annual Report—

- No later than two years after the date on which funds are initially provided to eligible communities and annually thereafter, the eligible communities shall submit to the DOE Secretary a report describing—
  - ✓ the implementation of the Energy Efficiency and Conservation Strategy, and
  - ✓ energy efficiency gains.

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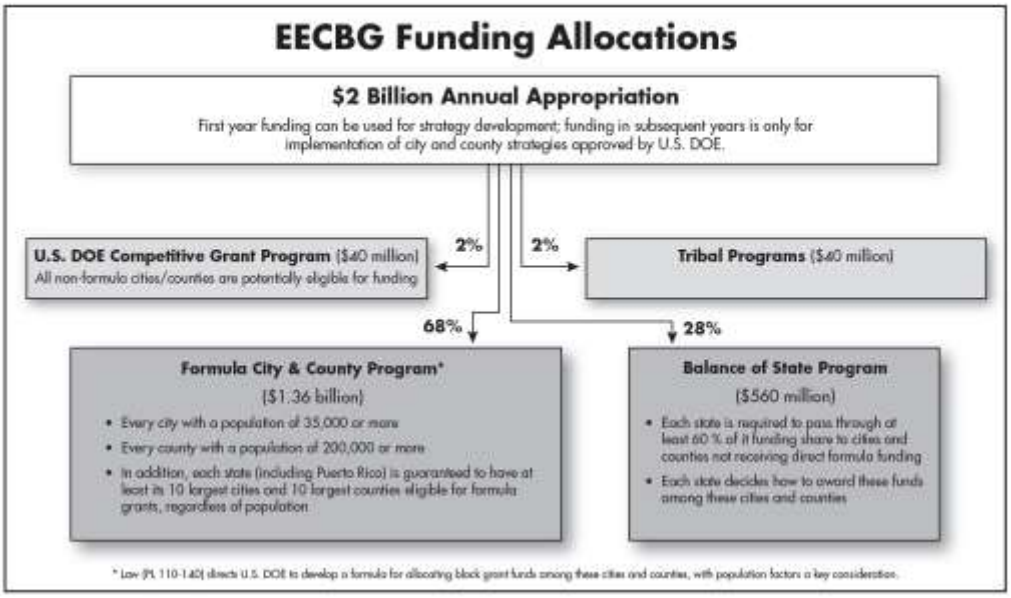
The Energy Efficiency and Conservation Block Grant (EECBG)


EECBG Funding Allocations
$2 Billion Annual Appropriation
First year funding can be used for strategy development; funding in subsequent years is only for implementation of city and county strategies approved by U.S. DOE.
U.S. DOE Competitive Grant Program ($40 million)
All non-formula cities/counties are potentially eligible for funding
2%
2%
Tribal Programs ($40 million)
68%
28%
Formula City & County Program*
($1.36 billion)
• Every city with a population of 35,000 or more
• Every county with a population of 200,000 or more
• In addition, each state (including Puerto Rico) is guaranteed to have at least its 10 largest cities and 10 largest counties eligible for formula grants, regardless of population
Balance of State Program
($560 million)
• Each state is required to pass through at least 60 % of it funding share to cities and counties not receiving direct formula funding
• Each state decides how to award these funds among these cities and counties
* Law (PL 110-140) directs U.S. DOE to develop a formula for allocating block grant funds among these cities and counties, with population factors a key consideration.

What are the Requirements for States under the EECBG Program?

- A state that receives a grant under the program shall use not less than 60 percent of the amount received to provide subgrants to non-entitlement communities no later than 180 days after the date on which the DOE Secretary approves a proposed Energy Efficiency and Conservation Strategy of the State.
- No later than 120 days after enactment of the law each state shall modify its energy conservation plan to establish additional goals for increased energy efficiency and conservation.
- Also within those 120 days, each state will submit to the DOE Secretary a proposed Energy Efficiency and Conservation Strategy that establishes a process for providing subgrants to non-entitlement communities and includes a plan for the use of their money to implement their energy conservation plan. The DOE Secretary has 120 days to approve or disapprove a proposed strategy. If a strategy is disapproved, the Secretary will provide reasons for disapproval and allow the recipient to resubmit as many times as needed until the Secretary approves a proposed strategy.)
- A state may not use more than 10 percent of amounts provided for administrative expenses.
- Each state that receives a grant under the program shall submit to the DOE Secretary an annual report that describes the status of the implementation of the State's conservation strategy, the status of the subgrant program, and the energy efficiency gains achieved.

Who is Eligible for U.S. DOE Competitive Grants and How Do I Apply?

- Units of local governments (including Indian tribes) that are not eligible entities and consortia of those units of local government can submit an application at the time and manner that the DOE Secretary designates and includes a plan that outlines the eligible activities that they will be implementing. Priority will be given to units of local governments located in States with populations of less than 2,000,000 or to plans that carry out projects that would result in significant energy efficiency improvements or reduction in fossil fuel use.

Appendix G: California Executive Orders and Legislation Pertaining to Climate Change

California Executive Orders Pertaining to Climate Change

- Governor Schwarzenegger Executive Order # S-14-08, November 17,2008, Increasing Renewable Portfolio Standards to 33 percent renewable energy by 2020.
- Governor Schwarzenegger Executive Order # S-13-08, November 14, 2008, Directing state Agencies to Plan for Sea Level Rise and Climate Impacts.
- Governor Schwarzenegger Executive Order # S-01-07, January 18, 2007, on Low Carbon Fuel Standard.
- Governor Schwarzenegger Executive Order # S-20-06, October 18, 2006, on responsibilities and roles of state agencies in climate change.
- Governor Schwarzenegger Executive Order # S-06-06, April 25, 2006, on biofuels and bioenergy from renewable resources.
- Governor Schwarzenegger Executive Order # S-03-05, June 1, 2005, establishing greenhouse gas emission reduction targets.

California Adopted Legislation on Climate Change 2008

- Assembly Bill 811 (Levine, Chapter 159, Statutes of 2008) – Contractual Assessments: Energy Efficiency Improvements.
- Assembly Bill 1470 (Huffman, Chapter 536. Statutes of 2008) – Solar energy: Solar Water Heating and Efficiency Act of 2007.
- Senate Bill 375 (Steinberg, Chapter 728, Statues of 2008) – Transportation Planning: Travel Demand Models:

California Adopted Legislation on Climate Change 2007

- Assembly Bill 118 (Núñez, Chapter 750, Statutes of 2007) - Alternative Fuels and Vehicles Technologies.
- Assembly Bill 236 (Lieu, Chapter 593, Statutes of 2007) - Public Resources: State and Local Motor Vehicle Fleets.
- Assembly Bill 532 (Wolk, Chapter 598, Statutes of 2007) - State Property: Solar Energy.
- Assembly Bill 662 (Ruskin, Chapter 531, Statutes of 2007) - Water Conservation.
- Assembly Bill 1103 (Blakeslee, Chapter 684, Statutes of 2007) - Energy: Renewable energy resources, hydrogen highway.
- Assembly Bill 1109 (Huffman, Chapter 534, Statutes of 2007) - Energy Resources: Lighting Efficiency: Hazardous Waste.
- Assembly Bill 1470 (Perata, Chapter 536, Statutes of 2007) - Solar Water Heating and Efficiency Act of 2007.
- Assembly Bill 1560 (Huffman, Chapter 532, Statutes of 2007) - Public Resources: Water efficiency in building standards.
- Assembly Bill 1613 (Blakeslee Chapter 713, Statutes of 2007) - Waste Heat and Carbon Emissions Reduction Act.
- Senate Bill 85 (Committee on Budget and Financial Review. Chapter 178. Statues of 2007)

- Senate Bill 97 (Dutton, Chapter 185, Statutes of 2007) - Directs Governor's Office of Planning and Research to develop CEQA guidelines "for the mitigation of greenhouse gas emissions or the effects of greenhouse gas emissions."

California Adopted Legislation on Climate Change 2006

- Assembly Bill 32 (Núñez, Statutes of 2006, Chapter 488) - California Global Warming Solutions Act of 2006.
- Assembly Bill 1803 (Committee on Budget, Chapter 77, Stautes of 2006) - Transfers greenhouse gas inventory to Air Resources Board from Energy Commision.
- Assembly Bill 1925 (Blakeslee, Chapter 471, Statues of 2006) - Report on carbon dioxide sequestration.
- Senate Bill 107 (Simitian, Chapter 464, Statutes of 2006) – Renewable Energy: California Renewable Portfolio Standard Program
- Senate Bill 1368 Perata, (Chapter 598, Statutes of 2006) - Electricity greenhouse gas performance standard.

Previous Recent Years

- Assembly Bill 117 (Migden, Chapter 838, Statues of 2002) – Electrical restructuring, Community Choice Aggregation
- Senate Bill 1078 (Sher, Chapter 516, Statues of 2002) – Renewable Energy: California Renewable Portfolio Standard Program
- Senate Bill 812 (Sher, Chapter 423, Statutes of 2002) – Climate Action Registry.
- Assembly Bill 1493 (Pavley, Chapter 200, Statutes of 2002) - Vehicle emissions, greenhouse gases.
- Senate Bill 527 (Sher, Chapter 769, Statutes of 2001) – Climate Action Registry.
- Senate Bill 1771 (Sher, Chapter 1018, Statutes of 2000) - Greenhouse gas emission registry and reduction and impacts on climate change. (2000 - PDF file)
- Assembly Bill 4420 (Sher, Chapter 1506, Statutes of 1988) - The California Energy Commission was directed to prepare and maintain the state's inventory of greenhouse gas (GHG) emissions and to study the effects of GHGs.

Appendix H: Recommended Changes Municipal Code

Hayward's Municipal Code, in relation to the climate change plan, is intended to achieve the following relevant goals:

- To protect the public health, safety, and welfare of the citizens of the City of Hayward;
- To gain compliance with state Codes, ordinances, and regulations in a timely and efficient manner.

This sections lists a number of recommended changes to the Municipal Code to successfully:

- Address the CAP's environmental, social and economic goals relative to applicable sections of the Code.
- Describe Climate Change Plan-applicable laws and ordinances for reducing greenhouse gas (GHG) emissions and its reliance on non-renewable resources for existing and future development.

The recommended changes impact the following sections of the Municipal Code:

Chapter 10: Article 1 – Zoning Ordinance
Chapter 10: Article 2 – Off Street Parking Regulations
Chapter 10: Article 3 – Subdivision Ordinance
Chapter 10: Article 11 – Historic Preservation

The general regulations apply to all districts and to all uses permitted in the districts. The provisions are intended to amplify and to supplement district regulations. In the event of conflict with the specific district regulations, whichever regulations are more restrictive shall apply, unless otherwise determined by the Planning Director.

Recommended Changes to Chapter 10: Article 1 - Zoning Ordinance

Municipal Code Section	Recommended Change
Sec. 10-1.2720 Special Lot Requirements a. Minimum Lot Frontage Except as provided herein, each lot shall have a minimum frontage of 35 feet.	1. In order to allow a wider range of housing, permit narrow lots for single-family detached homes that are alley-loaded, including reduced lot size widths of 30 feet for detached housing and 18 feet for vertically attached housing. Attached town homes or condos are allowed to have narrow lots (no min. specified in Code).
Yard Exceptions - Accessory Buildings and Uses (1) In conjunction with single-family development located on parcels zoned for same, and in zoning districts where single-family homes are permitted: (a) Accessory buildings not used for parking and not exceeding 14 feet in height and 120 square feet in area and detached from the main buildings, when located in area other than the required front yard (i.e., in side or rear yard area), shall be placed no closer than 3 feet from the side and rear property lines.	2. In order to facilitate the addition of more cost-effective housing, correlate the allowable height and area of Accessory Buildings with the lot size, using the overall lot coverage and rear and side setbacks as determinants, to permit large units on larger lots.
q. Front Yards - Driveway Width and Coverage (1) Driveway width, regardless of the number of driveways, shall not exceed 20 feet in front of the garage, except for 3-car garages where the width shall not exceed 26 feet. In addition, for access to a recreational vehicle storage area adjacent to a dwelling, a maximum 10-foot-wide driveway may be located on the opposite	3. In order to reduce the amount of impervious and low albedo surfaces, limit driveway widths to 18 feet for impervious paving, with exceptions for greater width only for pervious paving materials approved by the City Building Official, aesthetics notwithstanding.

Municipal Code Section	Recommended Change
side of the lot from the garage, and outside the required side yard.	
i. Private Street Criteria Approval of a private way as a private street (not part of a subdivision or other development project) for the purpose of establishing a street frontage for a lot shall be governed by the following: (3) In the instance that multiple lots are to be served by one private street, the following criteria may apply: (a) Six or fewer lots require a minimum of a 20-foot wide paved private driveway. (b) Seven or more lots require a minimum of a 24-foot wide paved private street. (c) Six or fewer lots may be served by a hammerhead. (d) Seven or more lots shall be served by a cul-de-sac.	4. In order to reduce the amount of impervious and low albedo surfaces on private streets, while maintaining emergency vehicle access, require a maximum of 20 feet street width for the travel lanes. 5. A circular or elongated turn-around should consisting of a maximum 12 feet width one-way lane enclosing a sustainably landscaped center.
k. Vehicle Parking, Repair, Display, and Storage Requirements (1) Single-Family Residential Uses. (a) Parking and Storage in Front Yards. Vehicles shall be parked in the required front yard only on the paved driveway which provides direct access to the garage from a public street or an approved private street, perpendicular to the street, or on a curved driveway. (b) Parking or Storage in Other Than Front Yards. (i) Parking or storage of vehicles in areas other than the front yard is permitted subject to the following requirements: (ii) Parking or vehicle storage areas shall be paved with asphaltic or Portland Cement concrete and conform to City standards.	6. Provide incentives for alley-loaded lots in order to reduce the predominance of front-loaded lots with driveways that constrain the placement of trees and the consistency and safety of the sidewalk. 7. Require or provide incentives for pervious paving materials with low albedo surfaces, as substitutes for standard asphaltic or Portland Cement concrete.
Industrial District The Industrial District currently allows office buildings only within business or industrial parks that are 25 acres or greater in size…and office buildings cannot exceed 40 feet in height. A Manufacturing district could be structured to accommodate manufacturing facilities as well as research and development operations. A new Warehousing district could respond to the needs of wholesaling and distribution uses.	8. Continue to allow mixed-use development such as allowing office buildings with first floor commercial in commercially zoned areas with permitted heights scaled to surrounding, desired conditions. 9. Locate transportation-intensive manufacturing adjacent to existing or extendable rail infrastructure and roadways. 10. Locate 'light manufacturing' and research and development uses in commercial/mixed use areas.

Recommended Changes to Chapter 10: Article 2 – off street parking regulations

Municipal Code Section	Recommended Change
Sec. 10-2.205 Administration Except where indicated otherwise, the Director of Community and Economic Development/Planning Director shall administer and interpret these regulations. Prior to authorization for occupancy of any structure, including authorization for gas and/or electric meter service, City officials shall ensure that the use, arrangement, construction, and improvements are in accordance with plans approved through the verification of zoning compliance procedure.	11. Adopt a Parking Management Plan that considers ways to reduce the need for additional parking garages, queuing of parking seekers, and the improvement of pedestrian access: 12. Parking Pricing: Set Prices to ensure parking availability 13. se Differential Rates Instead of Time Limits: Since short-term shoppers are the most important user to accommodate in the downtown, prioritize short-term users with time limits, or eliminate in favor of differential rate to simplify parking by eliminating the complex mix of meters. 14. Market Pricing: Setting rates to achieve an 85% occupancy goal. 15. Extend Meter Hours: If Hayward decides to adopt metered parking, extending meter hours would bring additional revenue for the City, and make it easier to find a parking space in the evenings. 16. Improve Payment Options: Consider options such as multi-space meters or pay-and-display machines.
Sec. 10-2.300 Required Ratio Of Parking Spaces Uses not specifically listed in this article shall provide the minimum off-street parking required of the use most similar in nature, as determined by the Director of Community and Economic Development/ Planning Director. Additional parking spaces may be required for developments requiring conditional use permits,	**Parking and New Development** 17. Reduce Parking Requirements Downtown: As downtown Hayward becomes a mixed-use, walkable district which has a lower parking generation rate than the single use suburban land use environment that dominates parking generation rates prescribed in the ITE Parking Generation Handbook, consider

parcel map or tract map approvals, or other conditionally approved projects at the discretion of the Director of Community and Economic Development/Planning Director.	parking demand at ranges from 1.6 to 1.9 spaces per 1,000 square feet of non-residential built space, or one- third to one-half of that typically required for conventional suburban development. 18. Consider Parking Requirements Strategies: Adopt a single "blended" parking requirement, for example 1.7 spaces per 1,000 square feet. This simplifies changes of use, for example from offices to restaurants. 19. Allow on-street parking along the property's frontage to count towards satisfying parking requirements. 20. Eliminate Parking Provision Requirements Downtown: Allow developers to choose the optimum amount of parking to maximize development feasibility and reduce traffic generated by excess parking. 21. Parking Maximums: Set parking maximums instead of parking minimums. With parking maximums, developers have a cap on the amount of parking that they may build on site. 22. Parking Preferences: Provide parking preferences in public lots, garages and on-street spaces for residents who rideshare or use low-carbon fuel vehicles.

Recommended Changes to Chapter 10: Article 3 - Subdivision Ordinance

Municipal Code Section	Recommended Change
Sec. 10-3.515 Pavement Surfaces All streets shall have an asphalt-concrete, plant-mixed surface. The thickness of the surface course shall be as determined by the method described in section 10-3.525 herein.	23. Require or provide incentives for pervious paving materials with low albedo surfaces, as substitutes for standard asphaltic or Portland Cement concrete.
Sec. 10-3.550 Private Streets Private streets, alleys or ways shall not be permitted unless approved by the Advisory Agencies and/or the City Council, and then only under conditions which guarantee the construction and continued maintenance thereof.	24. Permit and encourage the use of alleys in both new and existing development where feasible, in order to improve the quality of sidewalks and landscape along the street.
Sec. 10-3.845 Block Lengths Blocks shall not exceed 1200' in length between street lines in standard residential and industrial subdivisions. Block lengths in hill area subdivisions may vary from said standard when approved by the City Engineer who shall give consideration to the following factors in granting such approval.	25. Reduce the maximum length of blocks to 600 feet in new development, and encourage the installation of mid-block pedestrian walkways in longer, existing blocks to increase the degree of 'walkability' by making destinations more convenient.

Recommended Changes to Chapter 10: Article 11 – Historic Preservation

Municipal Code Section	Recommended Change
Sec. 10-11.05 Alteration Of Significant Structures Or Sites. a. Review Process. All development permit applications affecting a significant structure or site shall be reviewed as follows: (1) The Director of Community and Economic Development/ Planning Director shall review and may approve additions or alterations which will not adversely affect the exterior architectural characteristics or the historical or aesthetic value of a significant structure or site or its site or surroundings in accordance with the procedures for approval of an administrative use permit. (2) The Planning Commission shall review all development permit applications for proposed alterations of a significant structure or site which may substantially affect its style, scale, or bulk as well as	26. Encourage the addition of energy conserving measures to historic structures that do not qualitatively and adversely impact its historic value, including near-clear, low-emissivity glazing and roof-mounted solar collection equipment that is visually screened from any and all public rights-of-way. 27. Coordinate with federal, state, and regional governments to support the incorporation of GHG considerations into the policies and standards for the alteration of significant facilities.

Municipal Code Section	Recommended Change
new construction in an historic district or on an historic site. The Planning Commission's decision shall become final ten days after the decision.	
Sec. 10-11.06 Demolition Of Significant Structures. a. Applications for demolition of a significant structure shall include one (1) clear photograph of the front of the building and such other information as may be required by the City Building Official and the Director of Community and Economic Development/ Planning Director.	28. Consider and quantify the value of the embedded or sequestered carbon within the structure as important criteria in determining whether or not to allow demolition of a structure.
Residential zoning districts	29. Allow neighborhood-serving commercial uses.

Appendix I: Recommended Changes to General Plan

The City's General Plan, last updated in 2002, provides a fundamental means for documenting and integrating the Climate Action Plan's environmental, social and economic goals, objectives, principles, policies, and programs within each of the relevant General Plan's categorical elements, and the CAP's relationship to the community's development over a twenty-year time horizon. The Climate Action Plan process, therefore, requires an assessment of those General Plan elements and recommendations for modifications, deletions, and/or additions to the policies, etc. in order to fulfill the purpose of the CAP: reducing the community's greenhouse gas (GHG) emissions and its reliance on non-renewable resources, and improving the environmental, social and economic health of the community.

The City's General Plan is intended to:
• Address the CAP's environmental, social and economic goals;
• Describe policies for reducing greenhouse gas (GHG) emissions and its reliance on non-renewable resources for existing and future development;
• Provide methods for analyzing proposed development to determine consistency with the CAP goals, objectives, and policies.

The General Plan Elements addressed in the following documents consist of:

Chapter 2: Land Use
Chapter 3: Circulation
Chapter 5: Housing
Chapter 6: Community Facilities and Amenities
Chapter 7: Conservation and Environmental Protection
Chapter 8: Public Utilities and Services

Recommended Changes to Chapter 2: Land Use

Chapter 2 focuses on Hayward's lands within the City as well as those areas beyond the City limits that are within its sphere of influence. California's land continues to be developed at a rate almost three times faster than population growth. This expansive development has caused CO2 emissions from cars to rise even as it reduces the amount of forest, natural coastal and inland areas available to absorb CO2. Despite Hayward's fixed development boundaries, market pressures could continue to alter the City's development patterns. Growing out instead of within could exacerbate the adverse environmental impacts from increasing energy and water use to vehicle miles traveled. Land availability is a primary issue for the City of Hayward. The amount of vacant land available for business expansion and new development has become quite limited.

Recommendations to the General Plan's Principles
The General Plan follows "smart growth" principles that encourage the reduction of greenhouse gas (GHG) emissions and reliance on non-renewable resources for existing and future development.

The following recommendations could help "activate" the smart growth principles.

Principles	Recommendations
• Mix land uses	1. Codify to allow mixed use in most City areas to help reduce vehicle miles traveled (VMT)
• Take advantage of compact building design	2. Codify compact design in appropriate City areas to improve energy conservation
• Create a range of housing opportunities and choices	3. Codify a range of housing opportunities and choices in appropriate City areas to increase the ability to maintain neighborhood viability and value over time, and to help reduce vehicle miles traveled (VMT)
• Create walkable neighborhoods	4. Codify walkability in most City areas to help reduce vehicle miles traveled (VMT)
• Foster distinctive, attractive communities with a strong sense of place	5. Codify distinctive, attractive design in most City areas to improve economic value
• Preserve open space, natural beauty, and critical environmental areas	6. Codify the preservation of open space, natural beauty, and critical environmental areas, to increase local food production opportunities and carbon sequestering
• Strengthen and direct development towards existing neighbohoods	7. Codify incentives for developing in existing neighborhoods to reduce infrastructure and land consumption
• Provide a variety of transportation choices	8. Create a long range transit and pedestrian action plan to help reduce vehicle miles traveled (VMT)
• Make development decisions predictable, fair and cost-effective	9. Codify the development 'rules' to provide the 'rules' to equitably measure development's climate change benefits and drawbacks
• Encourage community and stakeholder collaboration in development decisions	10. Codify the standards for comparing and assessing development proposals to provide CAP benefits and drawbacks

The following recommendations address the Land Use Element

Excerpts from the Land Use Regulations and Development Standards	Recommendations
Industrial Corridor • Development regulations in the Industrial Corridor essentially presume and encourage a manufacturing-based economy, whereas a new approach may be warranted that better reflects the needs of the information-based economy. This is essential with regard to provisions for business parks and research and development firms.	11. Encourage 'green' manufacturing and determine development standards for a range of users, and appropriate locations. 12. Create redevelopment standards for business parks to allow a mix of uses, maximum building coverage, minimum parking requirements, and maximize pedestrian and transit access. 13. Allow work/live uses in commercial/mixed use areas.
Industrial District • The Industrial District currently allows office buildings only within business or industrial parks that are 25 acres or greater in size…and office buildings cannot exceed 40 feet in height. A Manufacturing district could be structured to accommodate manufacturing facilities as well as research and development operations. A new Warehousing district could respond to the needs of wholesaling and distribution uses.	14. Continue to allow mixed-use development such as allowing office buildings with first floor commercial in commercially zoned areas with permitted heights scaled to surrounding, desired conditions. 15. Locate transportation-intensive manufacturing adjacent to existing or extendable rail infrastructure and roadways. 16. Locate 'light manufacturing' and research and development uses in commercial/mixed use areas.
Integration vs. Separation of Land Uses • The separation of these industrial uses from adjacent residential uses makes it easier for emergency responders to mitigate and evacuate a hazardous situation. On the other hand, as portions of the Industrial Corridor are developed with more intensive uses, the increase in employee densities may result in a need for child-care facilities in closer proximity to the workforce.	17. Separate potential hazard-generating industrial uses from adjacent residential uses in designated locations and in flexible configurations, recognizing that the number of these types of users will decline over time. Hayward currently requires a use permit when an industrial use is located adjacent to residential.. 18. Allow the replacement of business parks over time by mixed-use centers populated with a majority of employment uses. 19. Permit the inclusion of child-care facilities in employment areas that protect the health and safety of the children.
Parking Requirements • Parking issues arise as more intensive development occurs in the Industrial Corridor. Parking requirements for warehouse uses are obviously much less than those for more intensive uses. This situation often inhibits the conversion of warehouse space to office and research and development uses. There are several approaches that might address this problem. Higher parking ratios could be required for all new	20. Minimize or eliminate minimum parking requirements. 21. Provide transit alternatives to driving and parking, and/or parking and shuttle ride lots. 22. Maximize on street parking wherever feasible. 23. Adopt a policy requiring limitations on idling for commercial vehicles, construction vehicles, buses and other similar vehicles, beyond state law, where feasible. 24. Provide an employer incentive program for a voluntary commute

Excerpts from the Land Use Regulations and Development Standards	Recommendations
buildings so as to facilitate conversion at a later date. Or, perhaps an overlay district could be applied to certain areas to address parking issues, including those related to conversion of warehouses to more intensive uses. In addition, it may be desirable to explore with industrial park owners the possibility of allowing on-street employee and visitor parking (no trucks) within some of the business and industrial parks.	trip reduction programs, such as car-sharing and other services that reduce the need for personal motor vehicle use.
Minimum Parcel Size • It may also be appropriate to consider increased minimum parcel sizes for certain types of industrial development. The minimum lot size in the Industrial District is currently 10,000 square feet. However, lots this small are not conducive to manufacturing or research and development operations. Perhaps the City should consider prohibiting the subdivision of industrial land into parcels of less than one acre.	25. Determine the appropriate lot size thresholds for industrial users that require buffering for security and public health needs. 26. Determine whether new large industrial areas are appropriate for the City, and whether these facilities can be redeveloped if and when this industry changes its requirements.

Recommendations for Chapter 3: Circulation

The City's General Plan Circulation Element addresses the movement of people and goods through and around the City through freeways, local roads, bus and rail transit, by bicycle and as pedestrians. Bicycle facilities are addressed in more detail in the Bicycle Master Plan; Recreational trails, including bikeways and pedestrian pathways, are addressed in the Open Space Element

The following recommendations address the Circulation Element

Excerpt from General Plan	Recommendations
Circulation Element	
• State law recognizes that circulation and land use are closely related and requires that policies in the Circulation Element and Land Use Element complement and support each other. The policies and strategies should demonstrate a balance between land uses and the transportation facilities that serve them. Within the larger context of the General Plan, the circulation policies are also interwoven with economic, housing, open space, air quality, noise, and safety policies. • Better integration of transportation and land use planning in Bay Area communities could help to reduce the use of the automobile. One obvious solution is to achieve a more balanced distribution of jobs and housing in the surrounding communities and the greater Bay Area. Although it is not always possible for people to live and work in the same community, this approach would help to reduce the amount of commute traffic traversing the City. Improved transit systems along with greater usage of transit could also help to reduce the amount of auto travel. These solutions are regional in scope and beyond the City's ability to successfully address or implement by itself. • Regional growth projections prepared by the Association of Bay Area Governments indicate that in addition to growth in Alameda County, Silicon Valley will continue to show significant gains in employment and the Tri-Valley and Central Valley areas will continue to add substantially more housing units, all of which will continue the existing regional imbalance in the distribution of jobs and housing.	27. Amend the General Plan to more comprehensively integrate the Land Use and Circulation Elements, rather than just including text from each in the Elements. 28. Describe polices that will enable people to live, work, shop, and recreate within walking or bicycling distance of some of the destinations of work, shops, schools, parks, and transit stops. 29. Accelerate workshops and meetings and other venues with regional transportation partners to plan collaboratively, and determine responsibilities and authority for implementation and, if need be, enforcement of new GHG reduction requirements, as each agency or entity contains different strengths and capabilities that should be utilized. 30. Develop local government quantification protocols, improve VMT estimation tools, and develop more refined land use and transportation models that reflect the benefits of high-quality development, and use these tools for planning and to measure progress 31. Modify zoning to allow mixed use in most City areas and to allow more compact design in appropriate City areas to help reduce vehicle miles traveled (VMT). 32. Modify zoning and development standards to allow a broader range of housing opportunities and choices in appropriate City areas to increase the ability to help reduce VMT.

Excerpt from General Plan	Recommendations
Dealing with Traffic on Highways and Major Arteries	
• Major increases are projected in the future for in-commuting from Oakland/Hayward and Contra Costa County, as well as San Joaquin County. • Hayward's central location within the regional transportation network, in combination with the imbalances in the growth of jobs and households throughout the Bay Area, have contributed to the significant amount of regional or through traffic congesting area highways, primarily during the peak commute hours, and spilling over onto City arterials and into residential neighborhoods. • The amount of regional traffic traversing the Hayward area … (regional through traffic that does not have an origin or destination in Hayward) contributes as much as 25%-30% of the peak hour traffic on some of the major arterials in Hayward. As a result, it is readily apparent that the City's ability to reduce local traffic congestion is inextricably linked to its success in enlisting the cooperation of surrounding jurisdictions in dealing with regional traffic.	33. Circulation policies must reflect the trends of aging population, changing demographics, rising gas prices, and longer commutes in the City's transportation, land use, and development standards, that will allow the market to respond to the demand for townhouses, condominiums, and smaller homes nearer to jobs, schools, and other activities. 34. Create policies to direct jobs and households to brownfield and other infill sites that reduce overall travel, congestion and emissions from cars. If a small percentage of the Bay Area's jobs and households were shifted over time toward redevelopment and infill, congestion, cut-though traffic, and emissions would be significantly reduced. 35. Encourage local employers to "hire Hayward" in order to reduce the distance for those employed in the City have to travel. 36. Update transportation models and surveys to capture data for and accurately reflect all modes of transportation. 37. Make reductions in vehicle-miles traveled (VMT) high-priority criteria in evaluation of policy, program and project alternatives. 38. Implement transportation planning procedures that consider demand management solutions equally with strategies to increase capacity. 39. Include all significant impacts (costs and benefits) in benefit-cost assessment of alternatives, including non-market or indirect impacts, such as improving mobility options or reducing air pollution and greenhouse gas emissions. 40. Improve infrastructure and Transportation Systems Management (TSM).
Linking Transportation and Land Use Planning	
• Better integration of transportation and land use planning in Bay Area communities could help to reduce the use of the automobile. One obvious solution is to achieve a more balanced distribution of jobs and housing in the surrounding communities and the greater Bay Area. Although it is not always possible for people to live and work in the same community, this approach would help to reduce the amount of commute traffic traversing the City	41. Revise development standards to allow appropriate mix of land uses in most areas of the City to facilitate the proximity of commerce and housing. 42. Where possible and appropriate, add housing, including affordable housing, in areas of Hayward best served by transit, jobs, retail options, and other services 43. Create a Safe Routes to School Program (SR2S) combined with more progressive school siting to allow most children to walk or bike to school, or at least use public transit.

Excerpt from General Plan	Recommendations
Proposed Transportation Improvements	
• Transit improvements essentially reflect proposals contained in the BART Long-Range Transit Plan or envisioned in the AC Transit Central County Transit Study. Although expanded express bus service across the San Mateo Bridge has been envisioned in the past and is supported in the Countywide Transportation Plan, funding is not included in the Regional Transportation Plan and efforts by AC Transit to implement this service have been rejected by the Metropolitan Transportation Commission. • Issues of importance to Hayward residents focus on the inaccessibility and infrequency of bus service and the perception of inefficiencies and duplication of transbay service between BART and AC Transit. Hayward residents have also indicated a desire for transit-related improvements such as coordinated transfers/passes, posted routes and schedules at bus stops, bus shelters, and safe, convenient parking at BART stations. The City, in cooperation with AC Transit, has undertaken a major project to install bus shelters and benches throughout the City. • The fundamental service design problem in Hayward is that the widely spaced BART stations and freeway overpasses provide very few opportunities for continuous east-west lines.	44. Partner with BART to improve bicycle access on trains, at Hayward's two stations, and other BART stations. 45. Consider the cost/benefits of a Hayward streetcar system that connects higher density neighborhoods and centers with BART and the City Center along transportation corridors. Because streetcars do not require dedicated ROW, their installation and operation is about 1/3 less that Light Rail Transit (LRT). 46. Support regional efforts to implement improved bus service, including Bus Rapid Transit (BRT). 47. Where possible and appropriate, provide incentives for attracting essential retail services in Hayward's main transit and economic corridors.
Walking and Biking	
• Walking (and biking) is popular as a form of recreation, exercise, and commuting for relatively short trips. Walking can be promoted as an alternative to driving if there are safe, attractive facilities. A network of pedestrian pathways between activity centers and transit facilities, as well as between residences, schools and neighborhood shopping, can encourage walking. • Greater use of bicycles can provide many benefits. Bicycles are a quiet, non-polluting form of transportation that does not directly consume fossil fuels or require vast amounts of land and expensive infrastructure. Bicycling can be encouraged with the provision of bikeways to major destinations and requirement of bike racks and lockers at destination points such as governmental centers or other places of employment..	48. Expand and improve bicycle and pedestrian infrastructure improvements such as adding additional bike lanes and introducing bike boulevards, and maintaining and improving sidewalks. 49. Increase bicycle and pedestrian safety by enforcement of existing laws, and partnering with other agencies to provide continuing education for motorists, cyclists and pedestrians. 50. Identify and improve areas with high auto/pedestrian and auto/bicycle collision rates. 51. Partner with other agencies to promote and market cycling and walking as an attractive alternative to driving 52. Reduce pedestrian block length by introducing mid-block crossings and reducing redeveloped or new block lengths to a maximum of 600 feet.
Intersection Level of Service (LOS)	
• A summary of the existing LOS conditions, including the calculated stopped delay in seconds per vehicle for PM Peak Hour conditions for all study intersections, is presented in Appendix G. Of the 27 intersections analyzed, 19 currently operate at an acceptable level of service (LOS D or better) during the PM Peak Hour. Four intersections operate at marginal conditions (LOS E), while four intersections operate at LOS F or unacceptable conditions. • The roadway miles of congested segments in 2005 were calculated to be about 98 miles in length. The roadway miles of congested segments in 2025 with the General Plan network were calculated to be about 92 miles in length. The roadway miles of congested segments under the Constrained Project were calculated to be about 96 miles in length.	53. Recommend an expansion of roadway and intersection performance metrics to include pedestrian, bicycle, and transit 'LOS' criteria to measure quantitative and qualitative metrics such as accessibility, intersection crossing times, and other relevant and contextual data. 54. As transportation design, planning, funding decisions are considered; recommend using the multi-modal evaluation metrics rather than the more conventional AASHTO and ITE Manual criteria. 55. Implement Intelligent Transportation Systems (ITS) for surveillance and traffic control, such as synchronized signals, transit and emergency signal priority, and other traffic flow management techniques, to improve traffic flow and reduce vehicle idling. 56. Develop infrastructure improvements such as HOV/HOT lanes and dedicated bus rapid transit right-of-ways. 57. Implement programs to reduce "incident-based" traffic congestion, such as expedited clearing of accidents from major traffic arteries, airport traffic mitigation, etc.

Excerpt from General Plan	Recommendations
Promoting Public Transit and Alternative Modes of Transit	
• The increase in traffic congestion within Hayward and throughout the region, as well as the collective environmental costs of automobile proliferation, have intensified the need to promote alternative transportation modes.	58. Provide continual educational opportunities for residents, businesses, and others to help them recognize the critical connection between urban development and vehicle travel patterns, its contribution to climate change, and its essential role in combating it. 59. Provide agency employees with incentives to use alternatives to single occupant auto commuting, such as parking cash-out, flexible schedules, transit incentives, bicycle facilities, ridesharing services and subsidies, and telecommuting. 60. Reduce greenhouse gas emissions from municipal fleet operations by purchasing or leasing high MPG, low carbon fuel or hybrid vehicles, or by using an external car sharing program in lieu of City/county fleet. 61. Work with major employers in the community to offer incentives and services to increase the use of alternatives to single-occupant auto commuting (voluntary commute trip reduction programs). 62. Encourage and facilitate the development of car-sharing and related programs.
Transit and Density of Development	
• Discretionary use of transit is primarily dependent upon frequency of service and proximity, both of which are linked to the density and design of development. More intensive development, whether denser residential development or concentrations of employment, supplies more potential riders along a route. Lower intensity development requires more route mileage to bring service close to residents and each route may have too few riders to be economically feasible.	63. Coordinate the scale of roadways with the scale of development and anticipated densities and uses.
Street Widening and Intersection Improvements	
• The City has completed several major street widening projects, including West A Street and D Street. Other widening projects are contemplated for the future.	64. Recommend the reallocation of funding for street widening to pedestrian, bicycle, and transit improvements. Street widening will not decrease GHG emissions since they tend to induce motor vehicle use.
Street Design	
• Principles of "smart growth" call for greater attention to the design of streets and the overall streetscape and consideration of how those aspects can contribute to the creation of more livable neighborhoods. Furthermore, the quality of street design can play a significant role in determining property values within a neighborhood and throughout the City. This section focuses on the design of the street pattern and public rights-of-way and the need for coordination with alternative modes (e.g. sidewalks, bicycle lanes) and consideration of related concerns (e.g., pedestrian safety, street trees and landscaping).	65. The criteria for the design of Hayward's streets should address the convenience, safety, and attractiveness for motor vehicles, pedestrians, and bicycles. 66. The design or redesign of existing streets for retrofitting should first determine the desired motor vehicle speed most appropriate for surrounding physical context, and for the integration of the desired alternative mobility modes – pedestrian, bicycles, and transit. 67. Rather than add speed bumps and other retrogressive elements, recommend using street design improvements, such as visual narrowing techniques, to reduce speeding.

Recommendations for Chapter 5: Housing

The purpose of the Housing Element is to identify local housing issues within the broader regional context, determine associated housing needs, and set forth a housing strategy that will address those needs, consistent with adopted goals and policies.

The following recommendations address sections of the Housing Element:

Excerpt from General Plan	Recommendations
Excerpts from Patterns and Trends	
• Developers thought of Hayward as a suburban, rather than an urban area where single family development could not be too dense; otherwise, the units might not sell. However, through the City's efforts to redevelop downtown and create transit-oriented housing, this perception is slowly changing. • Although the City is very supportive of mixed-use development to increase the supply of housing and highlight smart growth principles, many developers would prefer not to build these types of projects because they are much more complex to finance. Unless the project is in a high demand market, there is also the risk that the retail or office space will be or become vacant.	68. Recommend a form-based zoning code and development standards that reflect the desired uses, forms, and scale, and calibrated to the specific local context as a tool to add housing appropriate to Hayward's neighborhoods, centers, and corridors, and to the goals of the Climate Action Plan. 69. Recommend providing builder and developer incentives, such as expedited planning approval and building permitting for applications consistent with the City's codes and the CAP. 70. Recommend using a 'Town Architect' to review applications for consistency. 71. Recommend holding a forum with local, regional, and national builders, lenders, planners, and other real estate professionals and community representatives to exchange needs, desires, information and values relative to proposed new form-based zoning code and development standards, and the CAP.
Excerpts from Land Use Controls: General Plan and Zoning Ordinance	
• The City's General Plan and Zoning Ordinance provide for a wide range of housing types and densities, ranging from one unit per net acre in the Hayward Hills to a maximum of 65 units per acre in the downtown (Parts of the South Hayward BART plan allow up to 100 units per acre).In addition, the City allows a density bonus for developments that qualify under state law.	72. Recommend that a form-based zoning code and development standards specifically target those areas designated as infill and/or redevelopment opportunities.
• The basic concept is to make more efficient use of existing developed areas so that the need to accommodate growth through unfettered expansion of developed area is minimized. The basic principles can be summarized as follows: • Mix land uses • Take advantage of compact building design • Create a range of housing opportunities and choices • Create walkable neighborhoods • Foster distinctive, attractive communities with a strong sense of place • Preserve open space,, natural beauty, and critical environmental areas • Strengthen and direct development towards existing communities • Provide a variety of transportation choices • Make development decisions predictable, fair and cost-effective • Encourage community and stakeholder collaboration in development decisions •	73. Recommend a codification of the "basic principles" into specific, prescriptive standards to achieve the designed results: 74. Mix land uses – Create a wider range of permitted uses in more areas of the City. 75. Create a range of housing opportunities and choices – Provide builder/developer incentives and clear 'development rules'. 76. Create walkable neighborhoods – See the Circulation Element. 77. Foster distinctive, attractive communities with a strong sense of place – Create and adopt a place-based, form-based code. 78. Preserve open space, natural beauty, and critical environmental areas – Create more incentives for infill and redevelopment. 79. Strengthen and direct development towards existing communities - Create and adopt a place-based, form-based code to set specific rules for where and how infill and redevelopment will occur. 80. Provide a variety of transportation choices – See the Circulation Element. 81. Make development decisions predictable, fair and cost-effective – Create and adopt a place-based, form-based code. 82. Encourage community and stakeholder collaboration in development decisions – Require the uses of the Charrette process for all significant development planning.

Excerpt from General Plan	Recommendations
Excerpts from Parking Requirements	
• Hayward has reduced the parking requirements for residential developments on a case-by-case basis where development has been adjacent to transit or is a senior or special needs project. Success has been mixed. In senior and special needs projects, few problems have been noted. In market-rate rental developments, the City has gotten many complaints from the adjoining neighborhood and from tenants in the development about the proliferation of vehicles. Although many tenants take public transportation to work, each tenant has his or her own vehicle. Since rents are high, it is not unusual for three single adults to inhabit two or three bedroom unit.	83. Recommend lowering parking requirements to reduce the amount of impervious paving, discourage auto dependency, and encourage alternative mobility modes – while reducing housing cost. 84. However, reduced parking requirements require counterbalancing increases in convenient, safe, and accessible transit within a ¼ mile, and zoning and development standards that allow and encourage a comprehensive mix of uses as incentives to walk and bike to destinations. 85. Primarily residential areas with live-work (primary residence and allowed limited business) and/or work-live (primary business and allowed residence) will require specific parking strategies.
Expand The Housing Supply	
• Maintain an adequate supply of land designated and zoned for residential use at appropriate densities to meet housing needs, consistent with the objective of maintaining a balance of land uses. • Encourage mix of shopping, employment and residential use in areas that are to be more intensely developed. • Promote development of infill housing units within existing residential neighborhoods in a variety of housing types. • Encourage high-density residential development along major arterials and near major activity or transit centers. • Encourage developers to create housing units that accommodate varied household sizes and income levels.	86. Recommend that promotion include adopted land use and development standards that require – as opposed to merely encouraging – transit, bike, and pedestrian-oriented development – in appropriate centers and corridors. 87. Recommend permitting horizontal and vertical mix of uses in all appropriate locations, especially centers and corridors, including allow live-work and work-live units. 88. Recommend the drafting and adoption of a form-based code calibrated to the context of each City area, to provide infill building standards consistent with community values. 89. Recommend the drafting and adoption of a form-based code calibrated to the context of each City area, to provide compatible 'high-density residential development'. 90. Recommend the drafting and adoption of a form-based code that include flexible building types that are intergenerational, and provide a greater range of housing choices.
Conserve the Housing Stock	
• Maintain and upgrade the housing stock by encouraging the rehabilitation, maintenance and upkeep of residential properties.	91. Recommend City programs to provide incentives for sustainable building redevelopment. 92. Provide incentives such as flexibility in owner-builder options.

Additional Recommendations for Consideration: Land Value Taxes

The following describes one strategy for helping accomplish the goals of the Housing Element and the CAP. To accomplish some of these changes, Hayward may need to work with the County Assessor and possibly change state laws. Most property taxes base themselves on the highest and best use for the underlying land; and, whatever improvements are on the land. This causes two distinct problems as it relates to building:

First, it permits owners of land in downtown areas to remain undeveloped, such as parking lots, or under developed, such as one story buildings. Substituting a land value tax that primarily taxes the land, not the improvements (i.e., the buildings) will provide incentives to develop the land consistent with the City's land and development standards, since the economic value will naturally flow to those who are willing to develop the land.

Second, business and home owners pay a disproportionably large percentage of total property taxes (land + improvements) yet enjoy the same locational advantages as speculators, investors, and other non-users, all of whom pay far less. So, a shift to land taxation would lower individual home owners and business owners property tax bill, providing more "fairness" to the system.

Third, property taxes are far less "green" than land taxes. Firstly because they discourage building reuse but also because they lack the density incentives inherent in a land tax.

Fourth, a property tax provides an incentive for owners of land on the edge of Hayward to sell to developers who can build subdivisions on the underlying land, as long as the agricultural value of land is a fraction of what someone might sell it if it were developed as a residential lot. Thus, demand alone does not turn this property into conventional subdivisions; the property taxes provide an incentive for the rancher or farmer to turn the property into a subdivision.

Generally, in a land value tax, Hayward would provide a high improvements tax where open space preservation is wanted and a high land tax where more intense development is desired.

Land value tax references:

- Mark Alan Hughes, Why So Little Georgism in America: Using the Pennsylvania Case Studies to Explain the Slow, Uneven Progress of Land Value Taxation.
  http://www.lincolninst.edu/pubs/PubDetail.aspx?pubid=1275
- Spencer Banzhaf, How Smart is the Split-Rate Property Tax.
  http://www.lincolninst.edu/pubs/PubDetail.aspx?pubid=1372
- Richard England, Current Use Property Assessment and Land Development:
  http://www.lincolninst.edu/pubs/PubDetail.aspx?pubid=669
- A web-based course on Two-Rate Taxation of Land and Buildings:
  http://www.lincolninst.edu/education/leo.asp

Recommendations for Chapter 6: Community Facilities and Amenities

The Chapter provides a background for discussion of the community facilities and amenities, both existing and desired, in the Hayward area. Community facilities include public schools, libraries, and parks, as well as community and cultural centers. Amenities include historic resources and the surrounding open space that provides the visual setting for the City.

The following recommendations address the Community Facilities and Amenities Element:

Excerpt from General Plan	Recommendations
Schools • The increase in student enrollment, in conjunction with the state-mandated reduction in classroom size for the lower grades, has greatly exacerbated the overcrowding of existing school facilities and sites. In addition, all of the District's schools are more than 40 years old. They lack many of the facilities required for a quality education, such as modern libraries, comprehensive computer capabilities, and science and math labs.	93. Review latest Facilities Study to determine the potential for addressing sustainability issues at the macro scale (e.g., siting relative to walkability, proximity to student services, etc.). 94. Create a Safe Routes to School Program (SR2S) combined with more progressive school siting to allow most children to walk or bike to school, or at least use public transit.
Facilities • The continued use of relocatables can have significant impacts on individual sites… Construction of new permanent buildings would address these concerns and also create a better learning environment and improve the overall aesthetic appearance of the site.	95. Consider designing and building durable, flexible-use, multiple-story buildings that can accommodate a diversity of educational venues, and adapt to business and other uses over time without replacement, and conserve building energy more effectively.
Consideration of Surplus Sites • The District is currently evaluating the possibility of reopening school facilities on various sites now used for other purposes.	96. Revisit the siting and reuse criteria to determine: a) the types of buildings should serve as the most innovative, adaptable, and energy-efficient facilities in the long term; b) the sites should provide adequate connectivity to the neighborhoods they serve and daily needs required by the users, and greatly reduce the need for motor vehicle transportation and parking; c) the sites should serve as community models of adaptive, sustainable reuse economically, environmentally, and socially.
Schools as Community Centers At the same time the District is focusing on efforts to accommodate the need for additional classroom facilities, desires have been expressed by various segments of the community to have the schools enhance their function as community centers.	97. Minimize or eliminate minimum parking requirements. 98. Provide transit alternatives to driving and parking, and/or parking and shuttle ride lots. 99. Maximize on street parking wherever feasible. 100. Revise zoning and development standards to permit the building and rebuilding of facilities for an appropriate diversity of uses.
Park Sizes and Uses It may be desirable to consider more, smaller parks to adequately serve existing neighborhoods as well as new infill housing developments.	101. Revise park and open space standards and uses to allow both private and public gardens 102. Revise park and opens space standards to allow a range of sizes, including 'pocket parks' and other lot scale facilities within a two minute walk of most neighborhood homes.
Historic Preservation • Historic preservation can play an important role in enhancing the character of the community. Some buildings have been officially recognized as architecturally and/or historically significant structures.	103. Well-built, traditional buildings represent a timeless model of efficient, adaptable, and carbon-conserving structures that should be protected for their economic and environmental value, beyond their architectural significance.

Recommendations for Chapter 7: Conservation and Environmental Protection

This Chapter focuses on the conservation of natural resources and protection from environmental Hazards, including preservation of open space, protection of mineral resources, biological resources, and hydrology and water quality, and environmental protection including geological and seismic hazards, flood hazards, hazardous materials, air quality, and noise mitigation.

The following recommendations address the Conservation and Environmental Protection Element:

Excerpt from General Plan	Recommendations
Open Space Preservation	
• There is a need to protect surrounding regional open space and maintaining open space corridors within the urbanized area.	104. Recommend considerations for open space allocations for community food production.
Air Quality	
• The climate of Hayward is affected by its proximity to San Francisco Bay. Winds are predominantly out of the northwest during the summer months. As a result, Hayward has a relatively high potential for poor air quality during the summer and fall. When high pressure dominates, low mixing depths and bay and ocean wind patterns can concentrate and carry pollutants from other cities to Hayward, adding to the locally emitted pollutant mix. • There are currently no federal, state or local air quality-related constraints on cities in the Bay Area. Although the Bay Area is a federal non-attainment area for ozone, there are no plans to impose the federal sanctions provided for in the federal Clean Air Act. The BAAQMD has, however, developed guidelines and thresholds of significance for local plans that will affect the CEQA documentation for the Hayward General Plan Update. • Guide development into patterns that reduce dependency on automobile usage. • Require pedestrian-, bicycle-, and transit-oriented features in new development projects. • Encourage compact development featuring a mix of uses that locates residences near jobs and services. • Facilitate the development of higher-density housing and employment centers • Encourage employers and developers to provide bicycle access and facilities. • Incorporate subdivision, zoning and site design measures that reduce the number and length of single-occupant automobile trips. • Consider traffic calming strategies in capital improvement programs.	105. Recommend accelerated climate action coordination between Hayward and the surrounding jurisdictions to reduce regional emissions. 106. Recommend a special and continued focus on reducing both point source and tail pipe emissions in Hayward. 107. Incorporate and adopt sustainable development patterns into Hayward's zoning maps and development standards. 108. Draft and adopt development standards that require effective actions to enable robust pedestrian, bicycle, and transit mobility. 109. Draft and adopt sustainable development patterns into Hayward's zoning maps and development standards, and development standards that allow a range of uses as of right 110. Recommend the drafting and adoption of a form-based code calibrated to the context of each City area, to provide compatible 'high-density residential development'. 111. Require conformance similar to the LEED credits for facility bicycle access and facilities. 112. Draft and adopt development standards that allow a range of uses as of right, compact development, and multi-modal connectivity. 113. Draft and adopt street design standards that calm or slow motor vehicles through the design of the street section rather than retrofitting the street after construction. Refer to the draft CNU/ITE Street Design Manual. 114. Recommend advocacy for revision to CEQA to provide consistency with and relevance to the current and evolving state 'sustainable' policies and standards.

Chapter 8: Public Utilities and Service

This Chapter focuses on fire protection and emergency response, water supply and distribution, wastewater collection and treatment, solid waste management, telecommunications facilities, and energy conservation. The recommendations below address the energy conservation section of Chapter 8.

The following recommendations address the Public Utilities and Service Element:

Excerpt from General Plan	Recommendations
Excerpts from the Energy Conservation Regulations and Development Standards	
• Energy Conservation: The City may elect to go beyond outreach or provision of incentives in promoting energy conservation by adopting a variety of energy related ordinances.	115. Consider phasing in those sections of the new California Building Standards Commission adopted on July 17, 2008 in anticipation of its required implementation. The code will require improved energy efficiency and reduced water consumption in all new buildings.
Excerpts from Public Utilities And Services Policies And Strategies	
• Promote development patterns that are integrated with existing transit systems and encourage transit, bike and pedestrian circulation. • Encourage mix of shopping, employment and residential use in areas that are to be more intensely developed. • Develop an ordinance that encourages solar orientation in the site planning for new construction, protects solar access from future adjacent development, and promotes the use of solar systems where cost effective. • Seek to expand programs that capture energy from waste treatment.	116. Recommend that promotion include adopted land use and development standards that require – as opposed to merely encouraging – transit, bike, and pedestrian-oriented development – in appropriate centers and corridors. 117. Recommend permitting horizontal and vertical mix of uses in all appropriate locations, including live-work (primary residence, and allowed limited business) and work-live (primary business and allowed residence). 118. Recommend designing the ordinance accommodative of the specific physical context to maximize the potential of solar benefits while reducing the potential for adverse consequences (reducing a block's desired urban form and housing densities by reconfiguring the home sites for individual solar access). 119. Evaluate carefully the costs and benefits of waste-to-energy against significantly reducing and recycling solid waste.

Appendix J: Public Comments on the Draft Climate Action Plan

Comment #1

Let's take ***creative*** and ***bold leadership*** and make our Climate Action Plan one that other cities will want to emulate ... let's raise the bar to the limit, and then strive to reach what some may believe are "the unreachable." Like Sonoma County's ClimateProtectionCampaign, let's aim to reduce CO2 lower and faster than AB 32. AB 32 is good, but not good enough.

As you probably know, Dr. James E. Hansen (Director of NASA Goddard Institute of Space Studies) and Dr. Rajendra K. Pachauri (Chairman of the IPCC), and many others have expressed the need to take all means necessary to begin reducing CO2 emissions globally by 2012 and to continue reducing them at an aggressive rate thereafter if we are to have a chance at averting catastrophic climate change. They are unanimous in their assessment that we need to bring the atmospheric concentration of CO2 back to 350 ppm.

In Sweden -- an early champion of bold climate policy -- the person deemed most influential on the Swedish climate agenda (with the prime minister in third place and the environmental minister in fourth place) is Dr. Christian Azar, an IPCC scientist who has argued for over ten years that having a fair chance of staying within the temperature target set by the European Union requires a 350 ppm target.

I have a good friend who works for Dr. Azar. She showed me some of his graphs from 1997(!). It's painful to look at them and see that it was already so clear where we needed to aim a decade ago. And to know that we've wasted so much time.

With immediate action, the CO2 concentration will increase from the present 387 ppm up through 400 and possibly as high as 450 at the end of this century and into the next, but by mid-next century, CO2 will eventually return to 350 ppm. There will be significant impacts on human populations and our civilization. Scientist and military organizations have warned us of some of the possibilities that are in store for future generations.

Keep in mind that ice began to form on the planet 50 million years ago as the CO2 concentration declined below 425 (+/-75) ppm. Imagine an ice-free planet as we allow CO2 to increase and remain above 425 (+/-75) ppm. Please refer to ***Target Atmospheric CO2: Where Should Humanity Aim?*** (attached).

Comment #2

AB 32 reduction targets are aligned with the IPCC target range of 450 ppm to 550 ppm.

I was fortunate to meet Dr. Hansen in April and Dr. Pachauri in July. They both expressed their concern that 350 ppm is what current science indicates is necessary. Dr. Pachauri specifically stated that California's AB 32 target CO2 emission reduction targets are to be applauded, but insufficient to return to 350 ppm and a reasonable probability avert catastrophic climate change.

The 2050 CO2 emissions reduction target 80% below 1990 levels is insufficient. Lester Brown's target of an 80% reduction by 2020 intends to keep CO2 below 400 ppm. Hayward should take Lester Brown's assessment under consideration and aim lower than AB 32.

We have a choice. Let's be ***bold***. Let's be ***creative***. Let's be ***regional and national leaders***.

For the earth,
for humanity,

Doug Grandt

Part 1 of 3

Erik,

Last week after the joint work session of the City Council and Planning Commission, I promised to send you my thoughts in writing.
Since that time I have not had time to write, or to reread the Executive Summary or to even glance at the full report.

The past several days have been very full for me with a new harbor craft regulatory deadline; a major climate change presentation to residents of Lafayette, Moraga, Orinda, Walnut Creek, Alamo and Palo Alto; Measure A precinct captain training; and finally completing my tax returns -- I have not had an opportunity to put pen to paper.

This endeavor of reviewing and critiquing the Draft CAP is too important to try and develop a cohesive thought in one sitting, so I will try to lay out my thoughts in a series of short bursts. At some point, these chapters could conceivably be stitched together.

Bottom line: Last week at the joint working session of the City Council and the Planning Commissions, I attempted to address "two meaty topics" to use the Mayor's words in a short three-minute public comment. Judging from the responses around the table, I missed the mark. I just cannot speak in sound bites ...

My objective at the joint working session was five-fold:

1. To express my joy that the City has come to the pinnacle of activity in adopting AB 811 and publishing the CAP.
2. To express my total support of the report on AB 811 adoption, and to encourage its implementation in Hayward.
3. To clarify that staff's report on implementation of AB 811 and the Draft CAP refer to "solar" with apparent implication of "solar photovoltaic"
4. To demonstrate that we are conditioned to think of "solar PV" when the sole term "solar" is used. (Members of the City Council and the Planning Commission voiced "solar energy", "solar panels", "solar electric", "solar generation" and "solar plexus", but none voiced "solar thermal".
5. To ask that all references to "solar" in all documents make reference specifically to "solar photovoltaic", "solar thermal water heating", "solar thermal space heating" and "solar thermal space cooling" with the express purpose of educating all who read the documents, and ultimately to create awareness that solar thermal applications actually produce greater financial returns on investment and are economically available at this time. There is no need to delay installing such systems.

My message that the Draft CAP is insufficient and unacceptable was lost in my praise of its mere existence. I stated that the gap between the planned CO2 reductions and the targets set by AB 32 must be closed. To leave the gap open and subject to reliance on state and federal legislation is unacceptable when there are viable options to close the gap if one were to use a bit of imagination. One strategy to help close the gap is to target weaning ourselves off of coal, off of oil and off of natural gas. I stated that very clearly, but people seem to have only heard my approval of the report on AB 811.

Since I am unable to speak in sound bites in a three minute window, I will take this opportunity to develop my rationale for insisting that the draft CAP not be accepted as is, and I will make specific suggestion to make it sufficiently aggressive to warrant adoption.

Next: Part 2 will establish the urgency for aggressive action.

Part 2 of 3

Erik,

Imagine, in the beginning -- some four billion years ago -- the atmosphere was essentially anaerobic, poisonous to life and diversity as we know it. Concentrations of carbon dioxide were two orders of magnitude (100x) greater than the CO2 levels during the past several million years. Oxygen began to increase, spike and fluctuate dramatically about 2 billion years ago.

There was no ice on the planet during the first 4.5 (+/-) billion years of Earth's existence. Temperatures were sufficiently high so as to prohibit the formation of ice. Anywhere. Sea level was several hundred feet higher than today. It was a world we would not recognize, and difficult to imagine.

Carbon dioxide did not begin to decline significantly until about 50 million years ago when Azolla blooms in the fresh surface water of the extremely layered seas absorbed and sequestered COs through photosynthesis during a "brief" 800,000 period. As the concentration of CO2 declined through about 425 ppm, temperatures declined and made the planet more suitable to support life.

And ice began to form for the first time. At about 425 ppm ... remember that ... ICE < 425 ppm.

More and more CO2 was sequestered through photosynthesis and the temperature continued to decline with less greenhouse effect and more albedo. Various forms of life have come and gone during the past 50 million years. The concentration of CO2 during the past million years has stabilized in the range below 280 ppm. Ice has been present in amounts that fluctuate with the periodic hundred-thousand year Milankovich cycles, ebbing and flowing, but ever present.

With the industrial revolution and discovery of convenient and energy intense fossil fuels (coal, oil and natural gas) we have driven the concentration of CO2 from 280 ppm up to the current level of 387 ppm. Scientists who contributed to the U.N. International Panel on Climate Change 4th Assessment Report last year conclude that there is a high likelihood that business as usual scenarios will result in atmospheric CO2 concentration heading up to 400 ppm and beyond -- probably as high as 100 ppm depending upon how well we respond and mitigate CO2 emissions.

Imagine what will happen as the CO2 concentration returns to levels exceeding 425 ppm. Thereabouts, Earth will return to an ice-free state.

The rapid and unexpected acceleration of the Arctic ice cap melting fosters serious concern because the scientific models did not predict it -- this canary in the coal mine is dying a premature death -- premature by several decades. The implications of long-ignored global warming is now "in our face" instead of looming just beyond the horizon.

Dr. James E. Hansen (Director of NASA Goddard Institute of Space Studies), Dr. Rajendra K. Pachauri (Chairman of the IPCC), Dr. Christian Azar (IPCC scientist and author who has been deemed the person most influential on climate policy in Sweden, one country that is a roll model for climate policy) and many others have expressed the need to take all means necessary to begin reducing CO2 emissions globally by 2012 and to continue reducing them at an aggressive rate thereafter if we are to have a chance at averting

catastrophic climate change. They are unanimous in their assessment that we need to bring the atmospheric concentration of CO2 back to 350 ppm. With immediate action, the concentration will increase from the present 387 ppm up through 400 and possibly as high as 450 at the end of this century and into the next, but by mid-next century, CO2 will eventually return to 350 ppm. There will be significant impacts on human populations and our civilization. Scientist and military organizations have warned us of some of the possibilities that are in store for future generations.

I met Dr. Pachauri as well as Dr. Hansen during June and July. They expressed their concerns to me as individuals. Dr. Pachauri stated at his lecture to the Air Resources Board where I am employed that California's target CO2 reductions through 2050 are to be applauded, but they are not sufficient. He stated that we actually need to be more aggressive in reducing CO2 emissions.

Targeted 80% reduction of CO2 emissions below 1990 levels is insufficient. Some say we need to target 90% to 94%. Some say we need to actually must sequester more CO2 than we emit by 2050 if we are to avert catastrophic climate change.

AB 32 is not aggressive enough, so say the leading climate scientists of the world.

Hayward's CAP which strives to mirror AB 32 is, therefore, not aggressive enough.

As written, Hayward's plan admittedly falls far short of AB 32 targets for 2050.

The Draft CAP should be rejected in its current state. We must produce a CAP that is a model for other cities in California, in the nation, and around the world. Now is the time to address the issues and not to procrastinate.

Hayward has the opportunity to join and even surpass other cities that are taking bold, creative steps -- we know who those cities are. Berkeley took a bold, creative step with its BerkeleyFIRST initiative. Palm Desert took a bold, creative step by enlisting Assembly Member Lloyd Levine to advance AB 811 through to Governor Arnold Schwarzenegger's signature July 21, 2008.

There are a multitude of other cities and towns including Santa Monica, Santa Rosa, Rohnert Park and Sebastopol to name just a few.

Bold and creative ...

The CAP is neither as presently drafted. If it is adopted as presented, we will have missed a significant opportunity and we will have done our part in helping assure catastrophic climate change and all its implications for our offspring and their offspring and their offspring ... and their ... and theirs.

Next: Part 3 will address the gap between target CO2 emission reductions and the current plan.

Part 3 of 3

Erik,

The CAP makes the following statement in the **Meeting the 2020 target** section of the Executive Summary:

Given the estimated quantity of emissions reductions possible if Hayward achieves all program goals and implements programs according to the suggested timeline (154,600 MMTCO2e/year), the City will likely meet its target 2020 if the BAU emissions are closer to Scenario 2 projections.

However, without improvement to fuel economy or increases in renewable electricity generation, Hayward will not meet its 2020 target. This is a clear indication that state and federal programs will greatly impact Hayward's local emissions. If the state and federal programs are not successful, Hayward will not meet its emission target.

The following statement appears in the **Meeting the 2050 target** section of the Executive Summary:

This analysis indicates that ***the proposed CAP actions will not reduce emissions enough to meet the long-term emissions reduction target, even if recently established state and federal fuel economy and renewables goals are achieved.*** The City can do several things to help ensure long-term targets are met:

1. Make long-term CAP program goals more aggressive. It is technically possible for Hayward to meet its 2050 target by setting very aggressive program goals. To meet the 2050 goal, Hayward will have to eliminate all energy-related emissions (provide all electricity from renewable sources), eliminate all methane emissions from waste decomposition, and reduce fuel consumption to 70 percent below BAU levels. ***Though technically feasible, it will be extremely difficult for Hayward to achieve these goals without state, regional and federal cooperation.***

2. Work with state and federal agencies to ***encourage even more aggressive climate policies***. Scenario 2 assumptions are aligned with legislation that has already exists [sic] (CAFE Standards and RPS goals). Scenario 2 does assume a slight increase in both fuel economy and percent renewable energy generation by 2050, but these assumptions are quite conservative relative to what could be required by 2050. ***More aggressive state and federal policies will bring the projected emissions down, and in doing so will bring Hayward closer to its 2050 goal.***

3. Hayward should re-evaluate the CAP regularly to incorporate new technologies and new ideas that are not include in this iteration of the plan. In the future there may be more effective ways to sequester carbon, or more advanced technologies that Hayward would benefit from adopting. Technology improvements that may help Hayward meet the 2050 target include ***vehicles with higher fuel economy***, ***solar panels that can create more electricity per square foot and more cost-effective***, and ***energy-efficient appliances***. ...

This is not a plan. This is an assessment of some set of assumptions that preclude achieving the target. A plan should explore alternatives that will achieve the target, as well as the ramifications of adopting measures that achieve the target.

What is missing from the assumptions that restricts our ability to achieve the desired -- and mandated -- target?

Conversely, what alternative measures are available to us that will achieve the target? Put them into the plan.

For one thing, if we were to completely -- or nearly -- eliminate reliance on natural gas by promoting solar photovoltaic, solar thermal water heating, solar thermal space heating, solar thermal space cooling and energy efficiency measures in residences and commercial buildings, that would go a long way toward an 80%, 90% or 94% reduction. We can begin to make that happen using the CityFIRST program establish by Berkeley and AB 811. We need to prioritize Action 5.1 (priority 1), Action 5.3 (priority 2), Action 3.6 (priority 3), Action 3.7 (priority 4), Action 3.8 (priority 5), and Action 5.3 (priority 7) with start dates on each set with the highest urgency.

Simultaneously, we can make electricity from the grid carbon-free by promoting wind, solar photovoltaic, concentrated solar thermal, tidal and other emerging technologies and facilities in which entrepreneurs are now investing billions of venture capital right here in California. We need to prioritize implementation of a Community Choice Aggregation (CCA) program similar to others that are being developed now in several

cities and counties around the state. Where is this in the CAP? It appears that it might be Action 5.4. Let's set it at the highest priority with an immediate start date for investigative work. CCA should not be relegated to "later."

As Thomas Friedman stated December 16, 2007 in The New York Times: ***"It's Too Late for Later."***

A paradigm shift is needed in our way of thinking. By relying on federal fuel economy standards or appliance efficiency standards to incrementally improve efficiency by single digit percentage points while continuing to use the same old fossil fuel combustion technology, we will never achieve the target of 80% reduction in CO2 emissions -- let alone 90% - 94% that has been suggested by the leaders in science.

The solution is to eliminate carbon-based fuels and replace them with carbon-free fuels -- the solution is to leave the remaining carbon-based fuels in the ground -- or use them as building materials. To transition to that new paradigm will take time. Time is the limited resource here -- we have only 3 to 4 years to begin begin significant CO2 reductions.

We need to start immediately with technology that is available now. To wait for new improved technology will be a never ending waiting game. As with computer technology, we initially pay more, but the price comes down and we replace or supplement older less efficient machines with the latest greatest fastest processors.

We need to start with what is available now. There will be a return on the investment.

Hayward can take the ***bold and creative*** step of announcing -- like San Francisco recently did -- that it will install electrical outlets in its parking garages to charge electric and plug-in hybrids.. The task can be accomplished incrementally over time. By taking the initiative to install the "seed" of infrastructure and promote electrical automobiles, the reality will come to fruition sooner than later.

Although we cannot necessarily influence federal legislation, or even State programs, we can influence and accommodate our own residents who are more apt to rally in support of innovation than other parts of the state and other parts of the nation. State and federal legislators are less flexible and have more restrictions than do our mayors and city councils.

We cannot wait for federal or state programs. Hayward, like other cities around the state and around the nation, must take the lead with bold and creative local action.

The CAP is incomplete if it does not address innovative options to close the gap between perceived limitations and the required target.

The CAP cannot leave anything to chance.

Hayward must take control of its own destiny.

Next: Part 4 will address specific CAP language and priorities.

Comment #3

March 30.2009

Erik J. Pearson, AICP
Senior Planner
Department of Community and Economic Development
City of Hayward
777 B Street, Hayward, CA 94541

Dear Erik,

Re: Draft Climate Action Plan

First let me compliment the City of Hayward for taking this forward looking approach to a very much needed effort. It is critically important for all of us to understand and take action on our own and as a collective entity to deal with the impacts of global warming.

The costs of improving energy efficiencies to existing businesses and private residences seem to me to be both needed and daunting. Much of Hayward's housing was built long before many of us were aware of global warming. The construction of the housing and the appliances they contain could be costly for residents to modify. Both education and in some cases financial assistance would be needed. The plan does outline several potential strategies for achieving energy conservation that would reduce the carbon footprint and I would encourage the city to pursue any and all that might be available to achieve the desired outcome.

Reducing the carbon footprint on new building seems more manageable especially since the city does have a green building ordinance. The non-energy benefits described on pages 63-64 would apply to all buildings I think and might be a useful tool when conducting education outreach to various neighborhood groups.

The emphasis on solar capacity as a source of renewable energy is a very workable strategy for many commercial and residential buildings. The City of Berkeley's program for dealing with costs of installing solar panels seems to be a very useful model to follow as tailored to the needs of Hayward residents.

Is there a site that would be available within Alameda County to establish a county-wide composting facility? This would reduce the transportation cost and reduce greenhouse gases at the same time.

And finally, in the final paragraph page 82 of the draft sums up the intent of this plan very well. I would suggest that it might be possible to get a neighborhood or two to commit to implementing as much of the plan as possible to encourage other neighborhoods to follow suit. When Hayward does make significant progress on this ambitious project it will give us all something to crow about and make citizens proud to say that they live in Hayward. Than you for looking forward to our future as an energy efficient community reducing our carbon footprint on our world.

Yours truly,
Evelyn M. Cormier
31020 Carroll Avenue
Hayward, CA 94544
evcormier@sbcglobal.net

Comment #4

Author : Stopwaste.org (Heather Larson) (IP: 75.144.31.228 , 75-144-31-228-sfba.ca.comcastbusiness.net)
E-mail : hlarson@stopwaste.org
URL :
Whois : http://ws.arin.net/cgi-bin/whois.pl?queryinput=75.144.31.228
Comment:
Hi City of Hayward-
Please find below Stopwaste.org's comments on Hayward's Climate Action Plan. In general, it looks great!

1) Recommend adding the following introduction to page 97-98 (the funding section).

"The City Hayward can leverage its locally available funding by participating in the countywide project to green existing buildings. This will increase the likelihood of receiving competitive funding from federal, state and regional programs. In addition, the City will benefit from economies of scale in program administration, bulk purchasing, and consumer outreach."

2) Recommend modifying this paragraph on page 61:

"When the Ordinance takes effect, developers of new residential and commercial buildings will be required to submit documentation verifying that the building has been rated by the GreenPoints Rating 47 system, or a similar rating system like LEED.48 The City will not grant a Certificate of Occupancy without the required documentation."

To something like:

"By adopting a Private Development Green Building Ordinance, Hayward joined a number of Bay Area Cities, including Berkeley and San Francisco, that have adopted ordinances that require developers to follow industry-accepted green building standards when designing and building new buildings.46 When the Ordinance takes effect, new residential buildings will be required to be Green Point Rated47(or equivalent third party verified program) and commercial buildings will be required to meet LEED standards (or equivalent third party verified program).48 The City will not grant a Certificate of Occupancy without the required documentation from the respective program. While equivalent third party verified rating systems will be accepted for residential new construction, Build It Green's GreenPoint Rated system is referenced in the City's ordinance because; it is a California specific program and requires projects to meet or exceed all current State Codes. It is the program most
commonly adopted by Bay Area local governments therefore developers benefit from regional consistency. In addition, GreenPoint Rated has been endorsed by the California Building Industry Association and the Home Builders Association of Northern California. The estimated greenhouse gas emission reductions of GreenPoint Rated projects will be calculated in Build It Green's Climate Calculator and can inform the City of Hawyard climate action planning."

3) There is an error on page 61 (PDF page 87); footnote "GreenPoints Rating system," when it should say "Build It Green's GreenPoint Rated program" to be more clear.

4) Suggest that on Page 65 change "Build It Green: www.builditgreen .org" to "GreenPoint Rated Program: www.builditgreen.org"

5) Suggest that on Page 65 in place of the Boulder Program (used to be prominent program, now is one of many examples), include a more comprehensive list of sample Local Government Green Building

Ordinances, such as the Attorney General's Local Government Green Building Ordinances in California: http://ag.ca.gov/globalwarming/pdf/green_building.pdf

6) Page 65 also says:
"Additional GHG emissions reductions: Green building program results in solid waste reductions, but reductions in waste-related emissions were not calculated for the Climate Action Plan. Green buildings can also earn credit for innovative means of encouraging alternative modes of transportation (i.e. credit for secure bike parking), but CAP does not account for emissions savings from transportation." Suggest adding something like: "Some of these savings will however be captured through residential green building and the GreenPoint Rated Climate Calculator which estimate these types of emissions reductions."

Regards,
Heather

Heather Larson
Program Manager
_____
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Comment #5

Erik, let me offer some comments on the Draft Hayward Climate action Plan from my perspective as a transit planner.

First off, the plan is commendably clear about the central role transportation plays in greenhouse gas emissions. It is also important that the plan highlights the need to both reduce vehicle miles traveled and to reduce the carbon intensity of each mile. While many believe that reducing automotive carbon emissions is the sole answer, increases in vehicle miles traveled can erode or eliminate those gains.

The evaluation of specific potential emission reductions from various actions is interesting, but somewhat confusing. I believe there is additional potential to shift travel modes from cars to transit, walking, and bicycling.

Appendix C of the Plan provides detailed analyses of the assumptions used to derive estimates of greenhouse gas reductions. This section is based on an estimated growth of "commuters" from approximately 107,000 to 119,000 by 2017. It's unclear to me where this number comes from. The 2000 Census indicates that there were some 62,000 employed residents of Hayward. This number is likely to have risen to some extent, but not by 40%. Does the 107,000 figure represent two trips per commuter, one to work and one home? I'd also note that the definition of commuter states that it is a traveler entering or leaving Hayward, but approximately ¼ of employed Hayward residents work in Hayward.

Strategies 1.1-1.6 are intended to reduce single occupant vehicle commute trips and/or vehicle miles traveled. But the target effect of the strategy is listed only as a reduction in SOV travel by *new* commuters. While a reduction in the SOV share of new commuters is desirable, shifts in modes by existing travelers are also important. In addition, if transit service were improved such that new commuters had a different mode split, that transit service would be attractive to some existing commuters as well.

Such mode shifts would be more likely to occur if new transit service were coupled with new charges on driving and/or parking. Some of these charges might be instituted at the regional or county level, some in "destination" cities with large numbers of jobs. The Plan rules out disincentives as distasteful to drivers. Yet it seems increasingly likely that some carbon-related fees will be charged in coming years, with the major questions being which entities will charge them and how will they use the revenue. Charges can be highly effective—the high cost of parking in Downtown San Francisco helps dissuade commuters from driving there.

Implementation of a parking cash out program—not mentioned in the Plan—could help encourage use of transit and non-automotive modes. Under such a program, employers that provide free parking to employees would charge for the parking, and pay their employees the cost of the parking. The employee could use the money to pay for parking, or to pay for transit (or a bicycle). This would "level the playing field" so that all travel choices were supported, whereas today only driving to these workplaces is subsidized.

It is of course a very challenging time to be considering transit expansions, when transit funding has been cut so drastically. In the immediate term, there is likely to be less transit rather than more. In the medium-term, such as represented by Phase I of this Plan, the Bay Area will simply have to find fiscal mechanisms to adequately support transit. Hayward should consider how it can provide local contributions—such as development fees or entities buying transit passes in bulk—to this effort.

The Plan should also be bolder about estimating greenhouse gas reductions due to smart growth development. On p.120, the Plan states (with regard to Strategy 1.9) that "GHG savings from these actions are not calculated or evaluated due to lack of sufficient data." However, there has been substantial research on precisely this topic. The Urban Land Institute's 2008 publication **Growing Cooler** focuses on this topic, particularly in Chapter 4 "The Urban Development/VMT Connection." While the subject is complex, Hayward should be able to make a reasonable estimate.

In the meantime, the chart on p. 110 treats smart growth impacts differently stating "emission reductions included in other actions in this strategy." Presumably that statement refers to other strategies' proposals for transit and non-motorized improvements. It is reasonable to assume that transit improvements would be needed to pursue a widespread smart growth strategy in Hayward. However, residents in smart growth development can also take advantage of existing transit, making that transit more efficient. In this way, smart growth can create emission reductions are greater than the amount of transit improvement.

Please feel free to contact me if you have any questions about these comments. I look forward to continuing to work with you on the Plan.

Nathan Landau

Comment #6

To: City of Hayward
Council
Manager
Planning Staff

Comments on Climate Action Plan, March 31, 2009

by Sherman Lewis, President
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Problems of policy imagination and cross-policy linage in a complex situation.

The City at this time is processing several policies, including the Climate Action Plan (CAP), but it is not using innovative policies which are needed to achieve greenhouse gas (GHG) goals, and it does not adequately relate policies from one area to another. Partly as a result, the CAP is unable to achieve its goals in the out years.
The South Hayward Plans of April and June 2006 have good general ideas, but already assume replacement parking for BART and no exploration of rapid shuttles or of sustainable, affordable housing for people who do not own a car. By the time we get to the Wittek proposal of November 2008 and March 2009, the lack of imagination has become hardened into a project that goes directly contrary to the goals of the CAP and, indeed, the goals of the South Hayward Plan.

Looking first at CAP goals, there are now 1,207 parking spaces in the Wittek area, and the proposed development increases the number of spaces to 3,096, an increase of 157 percent. Car-oriented development is masquerading as Transit Oriented Development. Amount of City research into the market demand for car-free living? None. Amount of City research into fast shuttle access to BART? None. Estimates of savings to renter or home buyer from not having to pay for parking? None.

"Blame BART" is an excuse that works only at the most superficial level. BART is as conflicted over its replacement parking policy as anyone else. It has paralyzed station area development by creating huge costs not faced by other developers. It is all the more uneconomical with the collapse of housing prices. Neither BART nor cities, nor developers for that matter, have shown much if any imagination. BART needs to develop a replacement access policy to replace its promotion of global warming in the name of transit. But also, no one has come to BART and

said, here's a better way. Cities and BART have been almost brain dead on this issue, part of our larger American car culture problem.

With our brains anaesthetized by our car culture, we stumble towards the slow Armageddon of the end of the Holocene epoch, terminating with our own ignorance and recklessness the climate most supportive of our species. With our right hand we insulate houses and put up solar panels; with our left hand we increase parking and use of cars with public subsidies.

Now looking at selected goals of the South Hayward BART Plan:
"1) help create a vibrant, livable neighborhood with high-quality, safe, well-used public spaces,
...
3) encourage coordinated development that enhances the existing neighborhood fabric,
4) manage public and private parking resources to enhance the livability of the neighborhood,
5) encourage development that is oriented towards the street and is scaled to the pedestrian and
..." (South Hayward BART/Mission Boulevard Concept Design Plan, p. 3)

Concerning 1, do parking structures and increased parking contribute to a vibrant, livable neighborhood with high-quality, safe, well-used public spaces?

Concerning 3, do they "enhance the existing neighborhood fabric"?

Concerning 4, do they "enhance the livability of the neighborhood"?

Concerning 5, can they really be "scaled to the pedestrian"?

After Wittek came forward in November, the City considered revising the South Hayward BART Plan, largely by developing a Form Code. The Form Code proposal included five parking strategies (Dec. 2, 2008 staff report, p. 6 of 11, p. 3 of 5). While lacking in the ideas needed for rapid bus shuttles, the proposal was a big step forward.

Meanwhile, the City is working on the CAP. In fact, having a Form Code is CAP Strategy 1 Action 10. Form Code strategy 1 (TOD, transit passes, car sharing) is similar to CAP Strategy 1 Actions 1, 2, and 9. Form Code strategy 2 (reduce parking requirements, parking maximums, shared parking) overlaps with CAP Strategy 1 Action 3 (modify parking ordinances, time limits, paid spaces, let desired traffic limit spaces) and to Action 10 (vague "standards" to reduce GHG). Form Code strategy 3 (unbundling, cash out, metering) overlaps with CAP Strategy 1 Action 3 ("fees," but no detail).

Form Code strategy 4 (parking fee districts), however, has no CAP back up. The CAP should be improved to be as specific as Form Code ideas. The underlying problem is the scope of work in the CAP grant for the BAAQMD, which has historically been weak on transportation policies and pricing. It is, I hope, not to late to add the specific ideas of the Form Code strategies to appropriate Strategy 1 actions 1, 2, 3, 9, and 10.

The CAP, in its favor, has an item, Strategy 1 Action 7, that the Form Code needs and lacks: "Plan ...bus rapid transit that eventually greatly decreases the need for personal vehicles for travel within the City. ... the City will ...give preference to solutions that reduce auto dependency and minimize GHG emissions."

The City, however, takes too restrictive a view of rapid bus, excluding rapid shuttles (CAP Strategy 1 Action 4). Other cities — Union City, Emeryville, San Leandro — have supported their own services other than AC Transit. While they fall far short of rapid bus, they show a system that Hayward could build on.

Meanwhile, the City is processing Wittek, which totally ignores ideas I have put forward, the CAP and Form Code and goals of the South Hayward Plan. Instead, the City wants to spend millions of dollars of Redevelopment Agency funds as local match for state Proposition 1C Housing funds to build a very expensive parking structure that will subsidize increased Vehicle Miles Traveled.

City support for an unneeded structure at South Hayward, without exploring rapid shuttle replacement access with BART, means the City cannot very well try to stop CSUEB Hayward from building a parking structure. Publically subsidized parking structures are increasing GHG, undermining the policies of the CAP. We can't get there from here. The parking structure gun is shooting a hole in the GHG foot, and we will limp around bragging about fixing up houses.

I will be proposing a study of alternative access to South Hayward BART. I attach as part of this comment a slide show on sustainable access to CSUEB Hayward, compared to a parking structure. The rapid shuttle is less expensive than the structure and provides equal or better access.

The Sustainability Committee and Council should hold work sessions on policy integration concerning the CAP, the 238 Land Use Study, the Wittek Project, Prop 1C, BART access, the South Hayward Plan, and Form Code. The city needs more imagination about car free transit-oriented development and rapid shuttles, and more integration of related policies. The CAP plan's good policies need to beefed up and other policies need to be consistent with them.

Comment #7

Erik,
I'm having car trouble and may not be able to get to the meeting tonight. The one stand I want related to me is to STOP the LOOP project and slow the people Zipping through Hayward.
We need to attach shoppers and faster driving through our streets won't get them here to shop.

I would even support Foothill and Jackson becoming a toll road. That way we'd at least make some money off their passings.

Peggy Guernsey
25236 Delmar Ave
hayward, CA 94542-1806
510-881-7553

Summary of comments from second community meeting

The following is a summary of comments collected from worksheets participants filled out during the second community meeting on the Climate Action Plan. For each strategy we have listed action items or proposed changes to the Draft Action Plan that were identified because of comments received during the meeting.

Strategy 1

Comments from Worksheets

- Dixon Street as transit corridor with bus rapid transit
- Bus rapid transit S. Hayward-Fairview as proposed
- Bee – Mission – downtown with bus rapid transit
- Bus rapid transit to CSU
- Need another BART station at Harder & Mission Blvd
- Success of commuter benefits program depends on level of funding
- City uses inaccurate traffic modeling for non project alternatives
- General Plan has good ideas most implemented by zoning
- CAP not related to 238 Land-Use Plan – Need better TOD policies and stop Car-Oriented Development (COD)
- When updating codes, instruct staff to accomplish clear goals in the process of doing the updates (i.e. show how the new parking standards will reduce VMT)
- Allow community to participate in updating the Circulation Element of the General Plan.
- Have Steve Coyle review form-based codes
- Subsidized parking structures increases global warming
- QV – great for climate / great to avoid out-year parking failure?
- Need to identify more spaces for car-share cars & create ease of access
- Expanding transit services will require demonstrated commitment from riders
- Traffic signal synchronization is a large GHG benefit for the buck
- Review San Leandro's "links" program as a possible commuter benefit program.

Strategy 2

Comment from Worksheets

- Work with other cities to prepare for electric / plug-in vehicles

Strategy 3

Comment from Worksheets

- Focus on RECO & CECO first
- Estimate cost & cost savings associated with RECO and CECO
- RECO & CECO need more definition: should include calking, weather stripping, programmable thermostats, double-paned windows, insulation (older homes have asbestos), new furnace, new duct work.
- Efficiency improvements can be tax write-offs
- If Hayward uses CCA, the City could have access to funding for efficiency improvements

- CCA can fund large scale efficiency improvements
- An attempt to encourage a voluntary reduction in energy use is easy, achieving a 10% reduction in energy use is difficult. Need do to work with schools.
- Would commercial efficiency improvements impact productivity? If improvements have to be made off production time, it could increase cost.
- PG&E has installed smart gas and electric metering, can we tap into PG&Es system to get real-time feedback on energy use?
- Efficiency financing could be tough, can people afford a second mortgage?
- Hayward is in a housing depression. Many people don't have the money for efficiency improvements. They would need tax breaks.
- Offer carrots to encourage people to invest in energy efficiency
- 3.4 & 3.5 require behavioral change and are there fore unlikely to be successful
- For financing programs, focus on one neighborhood at a time, growing media, awareness, enthusiasm, then expand to other neighborhood
- Could target the club houses in mobile home parks for efficiency retrofits
- Habitat for Hayward could retrofit low income homes

Strategy 4

Comment from Worksheets

- Should be stringent to ensure maximum energy savings
- Will stringent development requirements drive developers away?

Strategy 5

Comment from Worksheets

- Plan should assume 100% success in eliminating fossil-fuel electricity as target. Aim for target, achieve 80%, 90%, or 95%
- CCA should be priority to be implemented as appropriate with or without inclusion of neighboring cities – begin evaluation ASAP
- CCA may be a great option for Hayward/ Alameda County
- Could Hayward join Marin's CCA?
- PV and solar-thermal co-gen
- Need to in clued wind and solar thermal in the plan
- Need to eliminate existing regulations that inhibit people from installing renewable energy. For example, existing regulations do not allow structures to be over 20 feet. If residents want to install wind turbines or tracking solar panels this regulation would likely be inhibiting.

Strategy 6

Comment from Worksheets

- Success will depend on level of funding and consistency of funding
- Need more participation in existing programs
- Many businesses only have room for a black bin
- Need C&D recycling staging area

- Encourage / impose plastic bag recycling @ large companies
- Require recycling in private sector construction projects
- Cause group interactions by trying to implant a ban
- Education at younger ages is critical to successful waste management
- Consider incentives for good waste management practices
- Offer coupons – real perceived incentive
- Educate younger generation via school curriculum
- Compile / update various groups (social & envit
- Use list-serves / online subscriptions to keep people informed
- HOA sign-up on list for action items or input
- Blog – keep city informed
- Send message to large stores by citing recycling problems – containers full so can't accept more plastic bags (ie. Target experience)
- Implement e-waste diversion program
- Offer historical artifacts from building demolitions to citizens

Strategy 7

Comment from Worksheets

- vast, low-cots opportunities exist for reforestation in urban and rural areas of the city
- Allow HASPA to have a more valued comment to City Council

Strategy 9

Comment from Worksheets

- Gateway projects / pilot projects would create visibility
- Strategic placement of "landmark" projects
- Not everybody has a computer, so a green portal website is not the only solution
- Green portal will require manpower to build an maintain
- CSUEB, Hayward High School, and Chabot Collage all have TV studios & courses in web and media. Could Hayward leverage these schools to help engage the community using modern media?
- Zucchini Festival / Blues Festival / other Festivals / Community Groups / Churches are good audiences and venues for change
- Community gardens can help reduce emissions from transporting food and can help create green spaces and community awareness

Other

Comment from Worksheets

- Reject fossil-fuel electricity generation within City limits
- City plans should not digress from State mandates. Hayward should fully participate in State programs
- City should take advantage of as many funding sources as possible.
- Plan needs to identify measures that will get us to 2050 target

- Show impact relative to non-pass-through travel separately
- CAP needs to identify actions that will allow the City to achieve targets based on AB 32.
- Set targets to be more aggressive. Current targets are not aggressive enough

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